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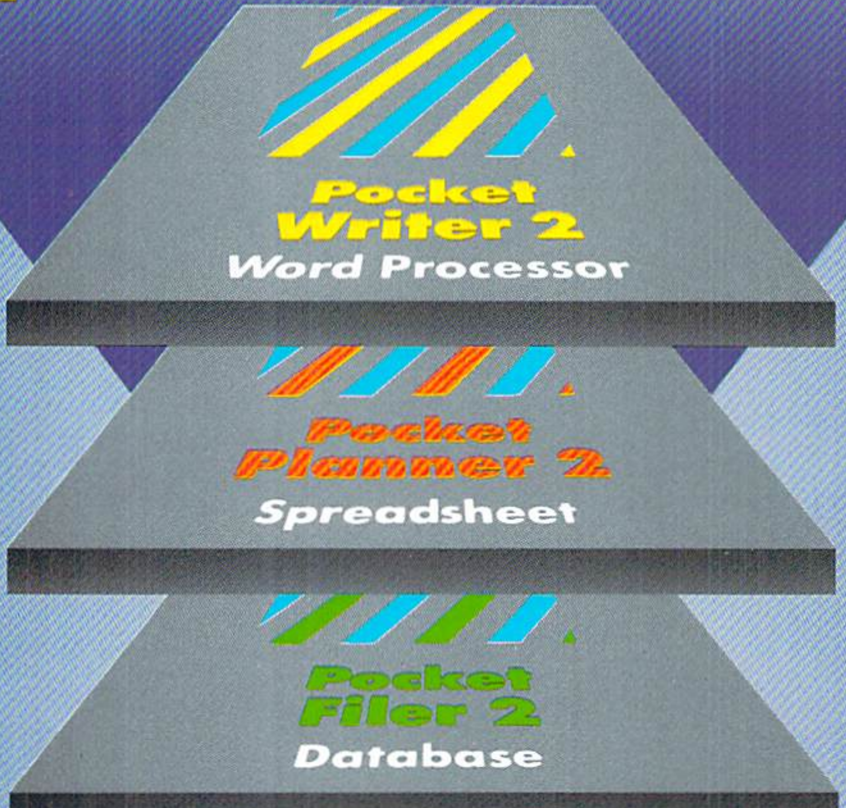

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*Commodore's Micro-computers Magazine, independent reviewers, rated the original Pocket Writer 128/64 and Pocket Planner 128/64 software the "Annual Best of 1986" in the productivity category.

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Reader Service No. 237

Ahoy!

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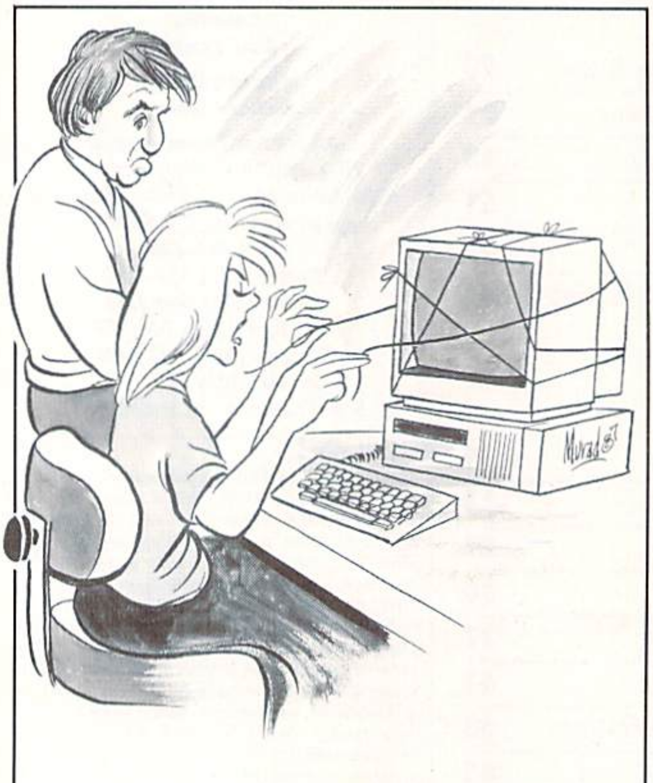
VIEW FROM THE BRIDGE

This issue of *Ahoy!* could as well be dedicated to Benn Dunnington. The publisher of *INFO* has complained more than once in his magazine about space-efficient hexadecimal programs squeezing out the BASIC listings in *Ahoy!* that users can type in and learn from. Benn, we can't promise that this will ever happen again…in fact, it was purely by accident that it happened this once…but save for a short lapse on page 89, this month's program listings section has gone completely back to BASIC!

And while we're resolving complaints: some C-64/128 owners have bemoaned the presence of Amiga coverage in the pages of *Ahoy!*…and vice versa. But in his bid for the Nobel Peace Prize, Morton Kevelson brings the divergent worlds together. Through examining several new products in our Commodore and Amiga review sections, the K (for Kevelson – not Kissinger) explains how to transfer files between the machines. The place to begin is Morton's introduction to *C-64 to Amiga File Transfer.* (Turn to page 51.)

We doubt that anyone will have a beef with the above, or with the rest of the contents of the June *Ahoy!:*

- Most of us have an idea of how fast electrons fly around inside our computers. But Dale Rupert explains that speed in terms a human being can almost understand in this month's *Rupert Report* on *Megaflops and Microseconds.* (Turn to page 20.)



"Well, don't you think I know *it's time to add more memory to my unit?"*

- After the reader reaction to his *Lixter* universal file printer in January, we tried as hard as we could to persuade Senior Editor Tim Little to write an equally popular follow-up. And though his chains occasionally got in the way of his typing finger, he came up with *D-Snap,* which makes it possible to edit any block of a standard GCR formatted disk. (Turn to page 27.)
- Taking his cue from the record companies that are converting hit albums of the past to CD format, Buck Childress adapts one of his most acclaimed 64 programs for the 128. *128 Multi RAM* will allow you to split your computer into four separate areas of memory. (Turn to page 30.)
- Another in the long tradition of primates who prefer human women to their own species, the title character of *Cave of the Ice Ape* will do anything to keep you from rescuing your beloved Maxine. (Turn to page 37.)
- Once you've been spoiled by the C-128's programmable function keys, you'll doubtless be greedy for more. *ALT-Key 128* gives you 37 more. (Turn to page 14.)
- We might not intrigue you by describing *Power Squares* as a cross between tic-tac-toe and a sliding tile puzzle. But the excitement of John Fedor's latest game is much greater than the sum of its parts. (Turn to page 41.)
- Cleve Blackmore provides two more testimonials to the efficiency of BASIC 7.0, with a pair of C-128 games unbelievably good for their short length. Each concerns a dirty job that someone's got to do: ferrying miners to the top of a treacherous cavern in *Galactic Cab Co.* (turn to page 63); and keeping the galaxy's phantom population under control in *Wraiths* (turn to page 18).
- This month's *Entertainment Software Section* details the *Strategy in Outer Space* required by such current sci-fi fare as *Star Trek: The Promethean Prophecy, Auto Duel, Portal,* and *Star Fleet 1.* Also featured are reviews of *Killed Until Dead, Murder Party,* and *Hangman Roulette.* (Turn to page 43.)
- We remind readers who missed our May issue that new *Bug Repellent* programs for the 64 and 128 are now in use. You must type in these new versions to generate checksums for any programs published from our May '87 issue onward. That means a little extra work for you – but thanks to the added features and convenience afford by these new programs, we've had no complaints yet! (Turn to page 82.)

But if you do have any, you know where to find us. We'd love to hear from you, irate or otherwise. —***David Allikas***

REPEAT OF A SELLOUT!

This month's *Ahoy! Disk*, like January's, comes with everything you need to get online with the QuantumLink bulletin board system, including a manual and all required software. See page 79 for details on ordering the June '87 *Ahoy! Disk.*

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Children's Carousel ($19.95) comprises nine games, including matching shapes and letter recognition.

For children aged 18 months to seven years, *Hodge Podge* ($18.95) presents cartoons, animations, and songs explaining articles and concepts like magnets, up and down, and color.

Dynacomp, Inc., 716-671-6160 (see address list, page 12).

COMMODORE BIZ MAG

Focusing on business applications of Commodore computers, *Money Machine* includes reviews of home management programs, tips on operating a small business with your Commodore, and templates for productivity programs like *Superbase* and *Vizastar*. Price of 6 bimonthly issues is $16. The publication also sponsors a Special Interest Group on QuantumLink every Monday night at 10 p.m. EST.

Money Machine Magazine, 904-622-1022 (see address list, page 12).

AWARD MAKER

The latest in the Hi Tech Expressions line of creative software, *AwardWare* ($14.95) lets C-64 owners design and print certificates, announcements, stationery, and memos. A variety of graphics, fonts, and borders permits a high degree of customization. An Atari version of the program is included on the flip side.

Hi Tech Expressions, 800-848-9273 or 305-854-2318 (see address list, page 12).

In addition to printing certificates, AwardMaker *lets you create a disk-based award that will flash on a friend's computer screen marquee-style.* *READER SERVICE NO. 243*

1571 UTILITIES

Free Spirit's *Super Disk Utilities* collection of programs for the 1571 disk drive includes single and dual drive file copy and disk backup systems, file unscratch, autoboot, write protect, file lock and unlock, CP/M Plus backup, 1541, 1571, and IBM System 34 format, and many other utilities, most of which work on the 1541 as well. Price is $39.95; shipping is free.

Free Spirit Software, Inc., 312-352-7323 (see address list, page 12).

GRAPHICS FOR GEOS

Available for $8.50 each are three disks of graphics created with *GEOS* and copyable directly into *GEOpaint* and *GEOwrite* documents. *Diskart1* and *2* consist of assorted graphics, while *Diskart3* is composed entirely of wheeled and winged vehicles.

Those Designers, 213-427-6742 (see address list, page 12).

C-128 DRAFTING/GRAPHICS

The Ruler enables 128-owning draftsmen, engineers, and architects, as well as home users remodeling the kitchen or planning a lawn sprinkler layout, to draw on a full size screen on a continuous sheet in computer memory. Components and parts most often used are kept in memory (electronics, hydraulics, etc.). Utilities on the disk permit the user to rearrange, modify, and combine components, as well as create new ones. A minimum of 128K expansion RAM is required, as well as a 1350 mouse or joystick (mouse recommended).

Bone Frontier Co., 303-427-8729 (see address list, page 12).

MORE MIDI

The *Master Tracks Pro* MIDI recording/editing system ($299.95), faster and more powerful than the original *Master Tracks*, gives the C-128 user real-time, step-time, and song mode sequencing with expanded memory. Multitrack songs can be created in sections or as continuous works.

Passport Designs, Inc., 415-726-0280 (see address list, page 12).

The *Master Editor/Librarian* for the C-64 or 128 and the Yamaha FB-01 ($99.95) includes such features as double banked memory, voice/bank/configuration/instrument dumps and editing, and bulk and individual file transfers of all data. The program is Passport and Sequential compatible.

MIDImouse Music, 503-622-5451 (see address list, page 12).

DISCOUNTED DISKETTES

Budget software purveyor ComputerEasy will redistribute a trio of C-64 oldies at $9.95 each: *Pinball Math* (arithmetic for grades 1 through 6), *Crazy Conveyors* (climb ladders, slide down poles, and traverse unpredictable moving conveyors), and *Touch Typing Tutor* (19 preprogrammed lessons and practice exercises).

ComputerEasy, 800-522-EASY; in AZ 602-829-9614 (see address list, page 12).

BASKETBALL HANDICAPPING

A basketball handicapping system from Software Exchange lets the 64 owner handicap the week's NBA games using only information found in the daily paper. About five minutes is required to enter the data the program requires to predict the winner, the point spread, and the total points. Information entered for the 23 pro teams is stored for later handicapping use.

Software Exchange, 313-626-7208 (see address list, page 12).

MEMORY EXPANDER EXPANDER

A 2 megabyte upgrade kit for the 512K Alegra memory expansion unit draws its power from the Amiga at the expansion connector, consuming under 5 watts. The two-piece case is designed to blend attractively with the Amiga. A 90-day warranty is included. Price of the upgrade kit is $479.00.

Access Associates, 408-727-8520 (see address list, page 12).

MAXI PLUS MACRO

The *MaxiPlan* spreadsheet for the Amiga is now available as *MaxiPlan Plus,* incorporating macros for recording and playing back complex or repetitive command series such as mouse movements, keystrokes, and menu selections. Price is $199 versus $149 for the macro-less version; registered owners of the latter can upgrade by mailing in $25 and their original disks.

Oxxi Inc., 714-999-6710 (see address list, page 12).

GAME RELEASES

Scenery Disk #7 for SubLOGIC's C-64 *Flight Simulator II* and *Jet* ($19.95) covers the east coast of the United States from Washington, D.C. through Key West, Florida. Included are hundreds of miles of coastline, rivers and roads, railroads, racetracks, transmitter towers, and elevated bridges. Among the visible landmarks are the White House, Washington Monument, and Pentagon.

SubLOGIC Corporation, 217-359-8482 (see address list, page 12).

Gamestar has adapted its *GFL Championship Football* to the Amiga. Price is $44.95.

Gamestar, 415-960-0410 (see address list, page 12).

New from Strategic Simulations:

Slated for spring release, *Realms of Darkness* ($39.95) offers more than 150 hours of C-64 fantasy and role-playing adventure for intermediate-level adventurers. You must defeat the Rogue Alliance in their 20-level dungeon stronghold with the help of seven comrades, chosen from among four races (dwarves, elves, gnomes, and humans) and eight classes (fighter, sorcerer, priest, thief, champion, knight, barbarian, and friar).

Battlecruiser ($59.95) allows the player to engage in ship-to-ship tactical combat in either World War I or II. The WWI disk includes British and German ship types with four fixed scenarios: two Jutland engagements, the battle off the Falkland Islands, and Dogger Bank. On the WWII disk are ship types for Britain, France, Germany, and Italy, with four scenarios: Cape Tuelada, the Bismarck chase, Channel Dash, and Sirte. Players can create their own scenarios, and choose from 158 classes of war ships. The computer keeps track of every shell hit and calculates damage. The game is designed for one or two advanced gamers, and up to four hours of play.

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Use the postpaid card bound between pages 66 and 67 of this magazine to subscribe. (Canadian and foreign prices are higher.)

The *Ahoy! Disk Magazine* is also available at Waldenbooks and B. Dalton's bookstores, as well as other fine software outlets.

SSI has also released *Roadwar 2000* in Amiga format.

Strategic Simulations Inc., 415-964-1353 (see address list, page 12).

Lie Detector ($15.00), a C-64 solve-the-murder text game, requires one to eight players to interrogate the 24 suspects and guess whether or not they told the truth. An average game takes less than one hour.

Nationwide Computer Industries, 912-783-1158 (see address list, page 12).

HELP FOR ADVENTURERS

QuestBusters, The Adventurer's Newsletter, now includes walkthrus (step-by-step solutions) to at least two games in each issue. Even gamers who sneer at such assistance can profit from the policy, by writing their own solutions to games they've solved. Each accepted walkthru will earn the author the game of his choice. One year (12 issues) costs $16; a free sample will be sent to anyone who forwards a self-addressed, stamped envelope.

QuestBusters (see address list, page 12).

VIC 20 SOFTWARE

We get letters every week from VIC 20 owners whose systems are still up and running, even if only in the kids' playroom. While we must continue to laughingly decline the VIC contingent's requests for support in these pages, MGH Software of Wisconsin has informed us that they've accumulated a large inventory of VIC software from various dealers and liquidators. They invite our readers to call or write for information.

MGH Software, 715-779-5600 (see address list, page 12).

AMIGA MEMORY BOARD

MegaBoard 2 ($599.95) adds two megabytes of RAM to the Amiga. The board utilizes programmable array logic and zip-package 256K dynamic RAM technology, allowing for a decrease in size and chip count. The unit, with a footprint of 4 X 10½", fits next to the computer.

Progressive Peripherals & Software, 303-825-4144 (see address list, page 12).

GENERAL PURPOSE INTERFACE

A customizable "real-world" interface for the 64 or 128, the Microtroll ($185.00) offers a number of features for the experimenter, technician, engineer, or advanced hobbyist. Among these are EPROM copy, compare and read functions, capacitance meter, and multiple timebase digitized scope display. The system has 16 analog inputs and 16 individually programmable digital input/outputs, 2 multirange analog outputs, 8K operating system, real-time clock, and an expansion connector for 32 more digital I/O channels or analog inputs. A BBS-based users group exists for support; its number is 303-597-8670.

Slide Mountain Systems, 303-449-4783 (see address list, page 12).

BORN TOO LATE

Time Traveler ($39.95) will print a list of significant data for any year from 1900 through the present—presidents, average annual income, prices, World Series winners, etc.—along with a calendar for any month of that year. The company's idea is that C-64 owners can clean up at malls and flea markets, selling shoppers printouts for their year of birth—though it will be tough to compete with those larger computers, already entrenched in America's shopping centers, that offer printout specific to the date of birth.

Nationwide Computer Industries, 912-783-1158 (see address list, page 12).

PrintMaster Plus
from Unison World
Grand Opening!

Revised to include IFF save ability.
READER SERVICE NO. 244

AMIGA PRINTMASTER UPDATE

Unison World's *PrintMaster Plus* printing and graphics program for the Amiga ($49.95) has been updated to include the ability to save graphics to IFF format, plus a built-in graphic ed-

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itor, increased flexibility in graphics placement, and two new fonts. Additionally, the *Art Gallery I* and *II* clip art packages have been expanded to provide more than 380 pieces each.

Unison World, 415-848-6670 (see address list, page 12).

FLEET 16

Turbo 64 ($189.00) plugs into the C-64's user port, increasing its speed from the present 985 KHz to over 4 MHz. The cartridge's 65816 microprocessor, which includes 64K of battery-backed RAM, turns the 64 into a 16 bit computer, its processing speed matching that of the IBM PC. Only programs using the built-in timer and real-time clock of the C-64 will fail to be speeded up. *Turbo 64* emulates the 6510 CPU of the C-64, allowing it to operate in normal C-64 mode. The EPROM included on the board enables the user to add other operating systems by burning in the program.

Swisscomp, 813-628-0906 (see address list, page 12).

LTD. TIME

C Ltd.'s TimeSaver ($79.95) provides the Amiga with a real-time clock calendar with battery backup, automatic time/date entry, programmable user-defined macro keys stored in 8K of CMOS RAM, built-in ROM-based macros, and command recall and line editing. A study in unobtrusiveness, the peripheral uses up no RAM and no desk space (it attaches to the underside of the Amiga), and plugs in between the keyboard and the computer, thereby leaving all ports free.

C Ltd., 316-267-3807 (see address list, page 12).

BOOKS

Two for the Amiga from Abacus:

Amiga Tricks and Tips ($19.95) is a collection of diverse programming techniques, including how to simultaneously display 64 colors on the screen, access libraries from BASIC, and create character sets. Also provided are tips on using AmigaDOS, graphics, programming aids, and the mouse.

The 550+ page *AmigaBASIC—Inside and Out* ($24.95) describes every command in detail and provides working programs for video titling, bar and pie charts, windows, pull-down menus, mouse commands, statistics, sequential and relative files, and speech and sound synthesis.

Abacus Software, 616-241-5510 (see address list, page 12).

The *BASIC 7.0 Programmer's Guide* ($19.95) provides numerous examples and sound instructions, loop programming, file administration, debugging, and list processing.

Progressive Peripherals & Software, 303-825-4144 (see address list, page 12).

Microcomputer Programming Languages ($18.95), originally published by Hayden, has been rereleased by John Wiley and Sons. The book examines and discusses the relative merits of over 20 languages and programming aids.

John Wiley and Sons, 212-850-6000 (see address list, page 12).

FORTRAN COMPILER

Reportedly the first Fortran compiler package for the C-64 that does not require CP/M, *64-Tran* ($50.00) will generate relocatable machine code from a Source program generated by any word processor that outputs sequential files. An included linker/loader will combine the machine code with system machine code to create a fast pure machine code program that can be saved and run. Standard Fortran statements are used, with some programming enhancements, such as an EXEC call routine that allows an interface to ML routines and to the system Kernal and 6502 registers.

Trident Software (see address list, page 12).

MUPPET MAKER

The *Muppet Learning Keys Toolkit* lets C-64 users add routines to existing software to render it compatible with the colorful children's keyboard manufactured by Sunburst. The company advises that knowledge of machine language will be helpful in implementing the routines.

Sunburst Communications, 914-769-5030 (see address list, page 12).

GRAPHICS INTERFACE

The *Hot Shot* Commodore graphics

Font master 128
Copyright (c) 1986 Xetec, Inc. All rights reserved
xetec
$59.95

A powerful word processing system for the Commodore 128

Includes: • On screen status/help display • 45 Fonts ready to use • Font editor/creator included • Foreign Language Disk

From the author of *FONTMASTER II* comes *FONTMASTER 128*, an enhanced version for the Commodore 128. This powerful word processor, with its many different print styles (fonts), turns your dot matrix printer into a more powerful tool. Term papers, newsletters and foreign languages are just a few of its many applications. Here are some of its capabilities:

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- Room for 9 SUPERFONTS concurrently
- Text memory: approximately 64k Bytes
- Supports more than 100 printers
- 80 columns
- PRG file merge
- File names can be picked from disk directories
- 4 keyboard macros
- Headers/footers
- Page number in decimal or Roman
- On screen underlining/highlighting of text blocks
- On screen status display, including pictures of fonts
- New font preview displays printer output on screen
- On screen bi-lingual editing
- Form letter/data merging
- Multi-color help screens
- Right to left editing features for foreign languages
- Loads in approximately 15 seconds with 1571 drive
- New formatters for inserting graphics into documents

Word Processing Printing Features

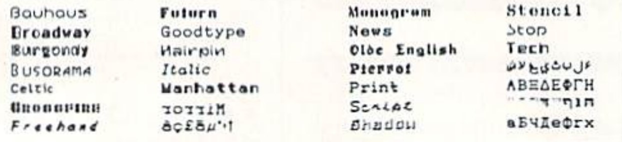
- 50 + two-letter format controls (embedded in text files)
- Fractional character spacing used on word-wrap, justification, centering, and right alignment
- Proportional spacing (user adjustable)
- Columnar printing (up to 4 columns)
- Overlaying of 2 or more characters (for phonetic markings, diacritics, etc.)
- 30 single-keystroke text modifiers (embedded in text files)
- Combine any or all of the following effects: underlining (adjustable) · more than 20 pitches · more than 50 line spacing sizes · condensed text · boldfacing · inversion (white letters on black) · superscripts (adjustable) · 3 text heights (micro-normal-tall)

Setup Module

- Two system setups can be made. In each, user can select his preference of colors (screen, text, cursor), printer interface (20 choices), and printer (over 100 choices)

Font & Character Set Creators

- Disk commands for maintenance of fonts or sets
- Grid for character creation/editing (manipulated with cursor keys, joystick, or light pen)
- Editing commands include: invert, flip, negate, shift, clear, copy
- Character can be printed while editing (font creator only)



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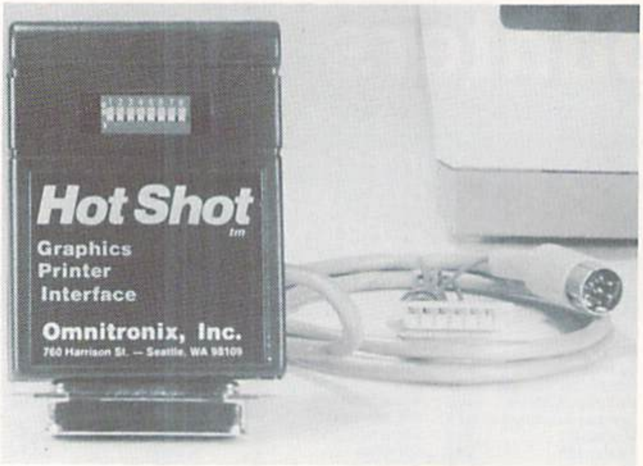

The Hot Shot printer interface comes with an empty socket where the user can plug in an 8K RAM chip, or it can be factory installed. READER SERVICE NO. 267

printer interface ($59.95) supports all standard printer interface features, including transparent, emulation, ASCII, and enhanced features mode. An optional 8K RAM chip will speed text and graphics printing. The easily accessible DIP switch allows selection of printer type, linefeeds, device number, and draft/NLQ. Graphics printing on most popular dot matrix models is supported. An internal 1K × 4 graphic buffer is included, and graphics optimization eliminates printhead shuffling under most circumstances.

Omnitronix, Inc., 206-624-4985 (see address list below).

EDUCATIONAL RELEASES

Two for the 64 from DLM:

Create with GARFIELD! Deluxe Edition ($39.95) lets students design personalized Garfield posters, cartoons, labels, and more. Over 200 pieces of art are included, plus a variety of typefaces. Cartoons can be displayed in slide show format or printed in color.

If obnoxious cats are not your saucer of milk, *Teddy Bear-rels of Fun* ($39.95) also contains over 200 pieces of art that allow youngsters to create stories, posters, labels, stickers, and the like. Slide show display and color printing are also possible.

DLM Teaching Resources, 800-527-4747 (see address list below).

A shower of new C-64 software from Sunburst, all but the last priced at $59

Continued on page 61

Companies Mentioned in *Scuttlebutt*

Abacus Software
2201 Kalamazoo S.E.
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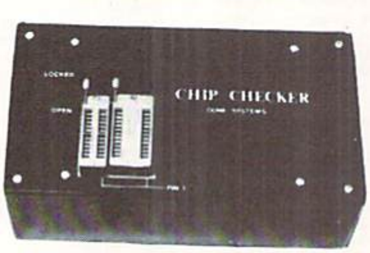

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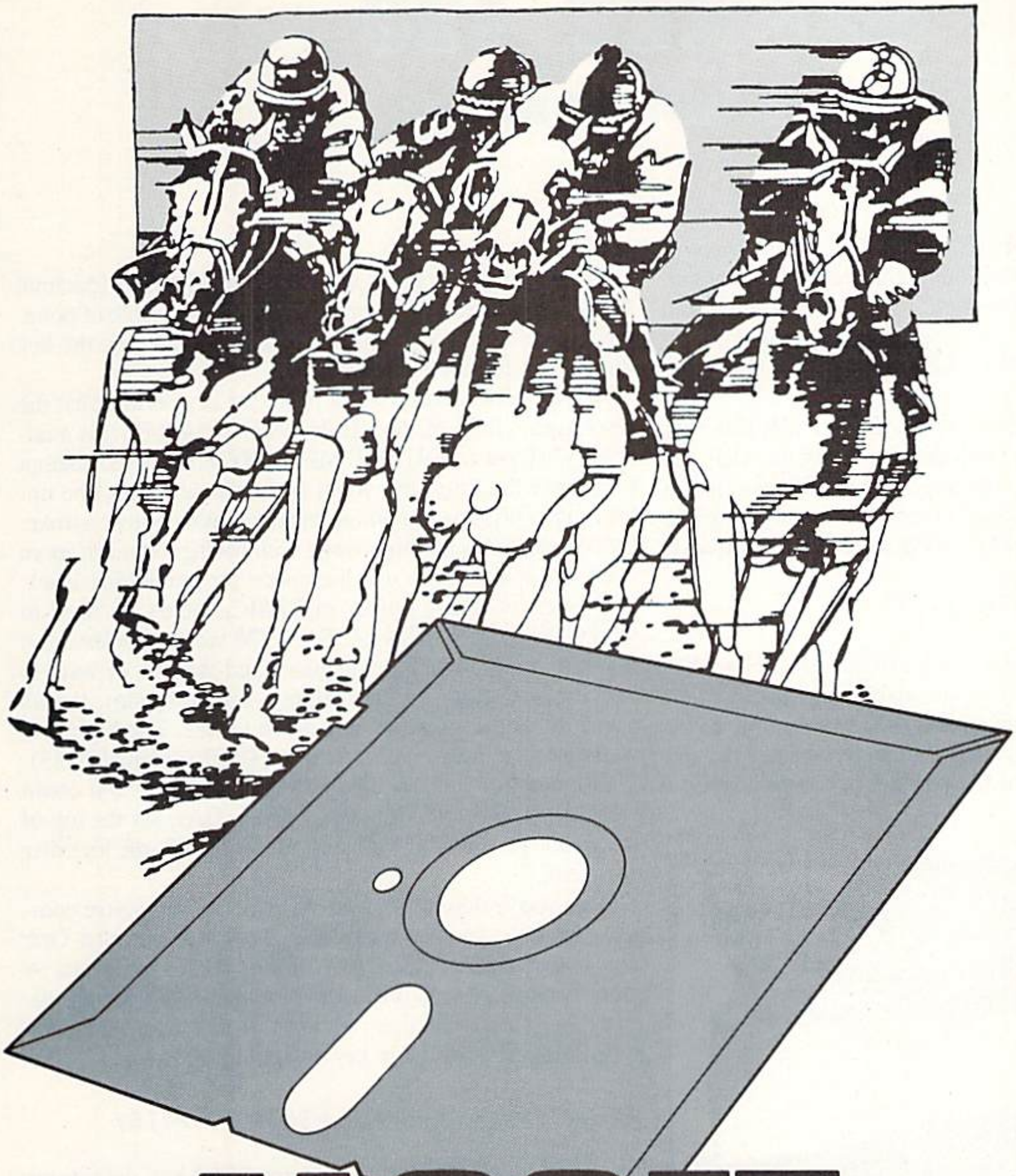

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ALT-KEY 128

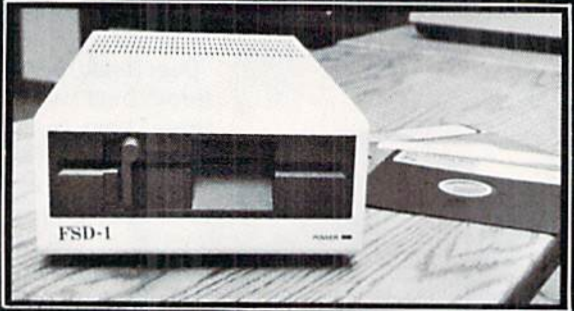
By R. Harold Droid

If your fingertips appreciate the one-touch power of the 128's programmable function keys, this program is ecstasy: 37 *additional* user-definable function keys, accessed by pressing an alphanumeric character in tandem with the ALT key. Your fingers never had it so good!

The command SYS 4864 enables *ALT-Key 128.* Entering the key definitions is easy with the new keyword ALT; the syntax mimics the KEY command which 128 owners are already familiar with. By way of example, to program the D key to generate a directory listing, enter this command:

```
ALT D,"DIRECTORY"CHR$(13)
```

Hold the ALT key, tap D and you're in business. Note that when combining CHR$( ) values and strings enclosed in quotes, you don't join them with a + sign, as required by the KEY command. Also, ALT with no parameters doesn't generate a handy listing of the current key assignments—just a syntax error.



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Reader Service No. 258

The program occupies addresses $1300-$1506 (decimal 4864-5407) in bank 15. Working storage and a table of pointers to each string follow the program. Then come the key definitions for each character.

ALT-Key 128 leaves a lot of room for key definitions: the whole space from $1580-$1BFF (decimal 5408-7167) is available. You'll get an 'OUT OF MEMORY' error if you attempt to go over the limit, but you'll probably never see one unless you're printing out whole sentences with one keystroke. Of course, there's nothing wrong with having too much room—unless you want to use the space for something else!

If you're working purely in BASIC, there's no need to worry about any of this; *ALT-Key 128* won't interfere. But if you're mixing machine language and BASIC, or want to run another utility program (like a screen dump), there's a way to cut the storage space down to size. The high byte of the storage-area limit is held at $1507 (decimal 5383). This location normally holds 28 ($1C in hex). You could POKE this location with, say, 26 (hex $1A), set the top of string storage at $1A00, and keep $1A00-$1C00 safe for other purposes.

Once you've developed a set of key definitions you're comfortable with, you'll want to save them for posterity. One way is to write a BASIC program of ALT statements. A more convenient way is to save the pointers and strings directly, so you can call them back at any time with a BLOAD command. To save your key assignments, enter

```
BSAVE"filename",B15,P5408 TO P7167
```

It's also possible to save the program and key definitions together as one file. But first you'll have to alter the program with a POKE so it won't reset the pointers every time you SYS to it:

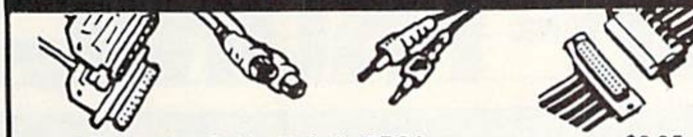
```
POKE 4893,96:BSAVE"filename",B15,P4864 TO
P7168
```

You don't have to save the whole range of memory. The expression PEEK(5494)+256*PEEK(5495) returns a pointer to the end of the key definitions. Everything above this address up to the storage area limit is empty. Replace address 7168 in the BSAVE command with the value returned by this expression, and you won't write unused bytes to disk. You'll also avoid the possibility of needlessly clobbering something when you reload.

Alert readers will note there are only 36 alphanumeric characters (letters A-Z, numbers 0-9). *ALT-Key 128,* however, offers 37 programmable keys. The odd man is in the @ key. Consider it a quirk in the program, or look on it as a bonus. If you decide not to use it, you'll still have plenty of options left. ☐

SEE PROGRAM LISTING ON PAGE 98

CABLES & ACCESSORIES



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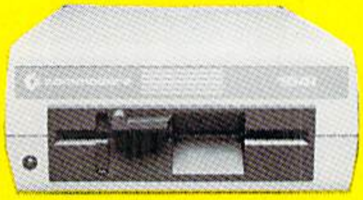

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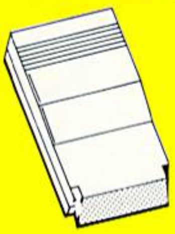

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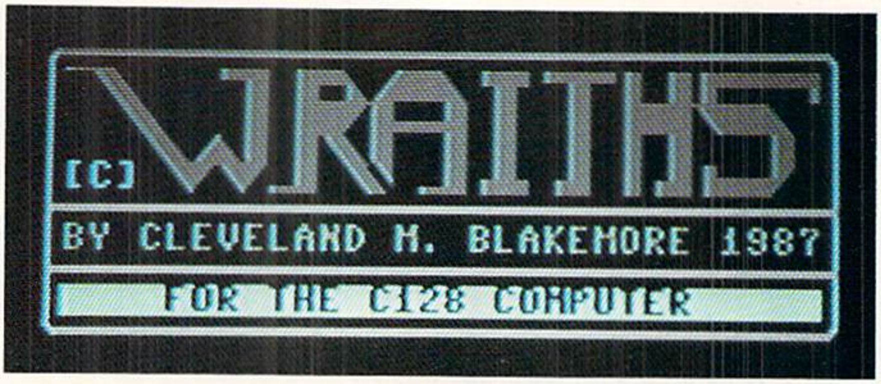

[C] WRAITHS

BY CLEVELAND M. BLAKEMORE 1987

FOR THE C128 COMPUTER

This is just a shoot-the-aliens, whistle-and-bells arcade game for the C-128 with the best darn graphics I've ever programmed. It is in BASIC 7.0 with a little bit of machine language.

The Wraiths are a strange race of malicious space-roaming lifeforms, seeking to take over the entire universe, sector by sector, by breeding more and more of their own kind until they are as thick as hornets. They are vaguely nebulous, spinning clouds of particles, funneling about constantly. They convert ordinary matter to antimatter to ingest as energy, and have been known to lay waste to entire galaxies this way.

You are a lone scout fighter, patrolling this sector of the galaxy to keep the Wraith population in check. It's a tough, gritty job, but.... You've been assigned to the orbit of an unknown planet suspected of harboring Wraiths.

The game uses a joystick plugged into Port 2. Move the stick right to rotate clockwise, left to go counterclockwise. To fire your thrusters, push the joystick in the direction you are pointing and push the button. To fire your laser, press the fire button with the joystick centered, or in any direction but the one you are pointing in.

The screen wraps around for both your ship and your laser fire, and collisions can occur offscreen! Try to stay onscreen unless you are using the wraparound for a strategic move.

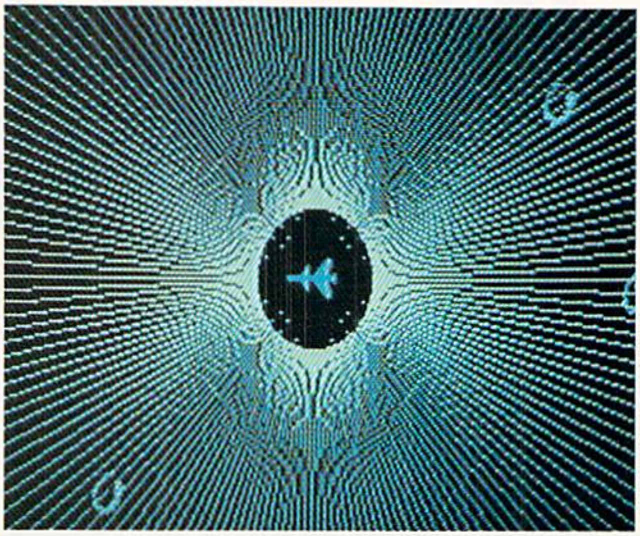

PHOTO: MICHAEL R. DAVILA

There are six Wraiths to destroy on each level. If your ship is destroyed by a Wraith, you will start on the same level again, with six Wraiths. You have three ships per game.

The Wraiths grow more and more furious during the battle, so waste no time in destroying them. As their comrades are eliminated, the remaining Wraiths will move faster and more dangerously.

My highest score is 12,500 on level 6. The Wraiths move very quickly after the fifth level, consuming everything in their path.

When you lose your last ship, the planet will be converted to antimatter in an incredible conversion process, as the Wraiths infest the entire sector.

When you exit this game, hit RUN STOP/RESTORE before performing a GRAPHIC CLR, as the interrupt routine may corrupt the BASIC portion of the program otherwise. ☐

SEE PROGRAM LISTING ON PAGE 87

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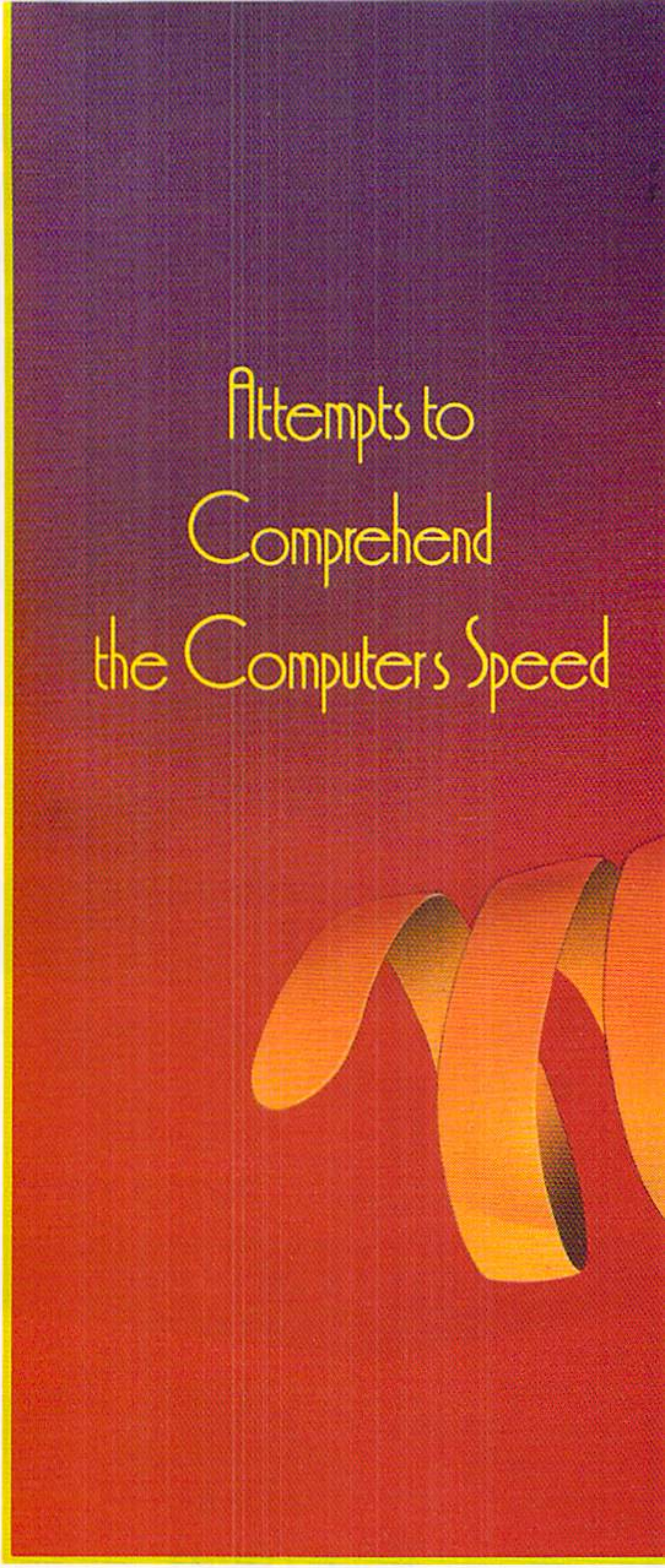
Attempts to Comprehend the Computers Speed



Mere mortals cannot comprehend nanosecond time scales. Human reaction times are generally measured in milliseconds or seconds. For measuring computer performance, units a million times smaller are more appropriate.

When we sit twiddling our thumbs, impatiently waiting for the computer to finish some calculations, we tend to disregard the quantity of operations it is performing. The computer is powerful even though none of its operations are very complicated in themselves. The computer's power comes from its speed and its ability to execute millions of instructions each minute.

In order to gain an appreciation (if not a comprehension) of sub-second events, we will put our computer's through their paces, as we observe with stop watch in hand.

BASIC THE SLUGGARD

Everyone knows that BASIC is slow (with a long "o"). For many applications, BASIC is actually a speed demon when compared to our biological processors. Quick, what is two plus two? How long did it take your brain to return the answer to your lips? Less than a second? Maybe a tenth or a hundredth of a second? Probably not less than a millisecond (one thousandth of a second).

If we had made the problem any harder (thirteen plus eighteen), a 100-millisecond response time would be respectable for the human mind. Try this simple program for a hint of the capabilities of our electronic computers.

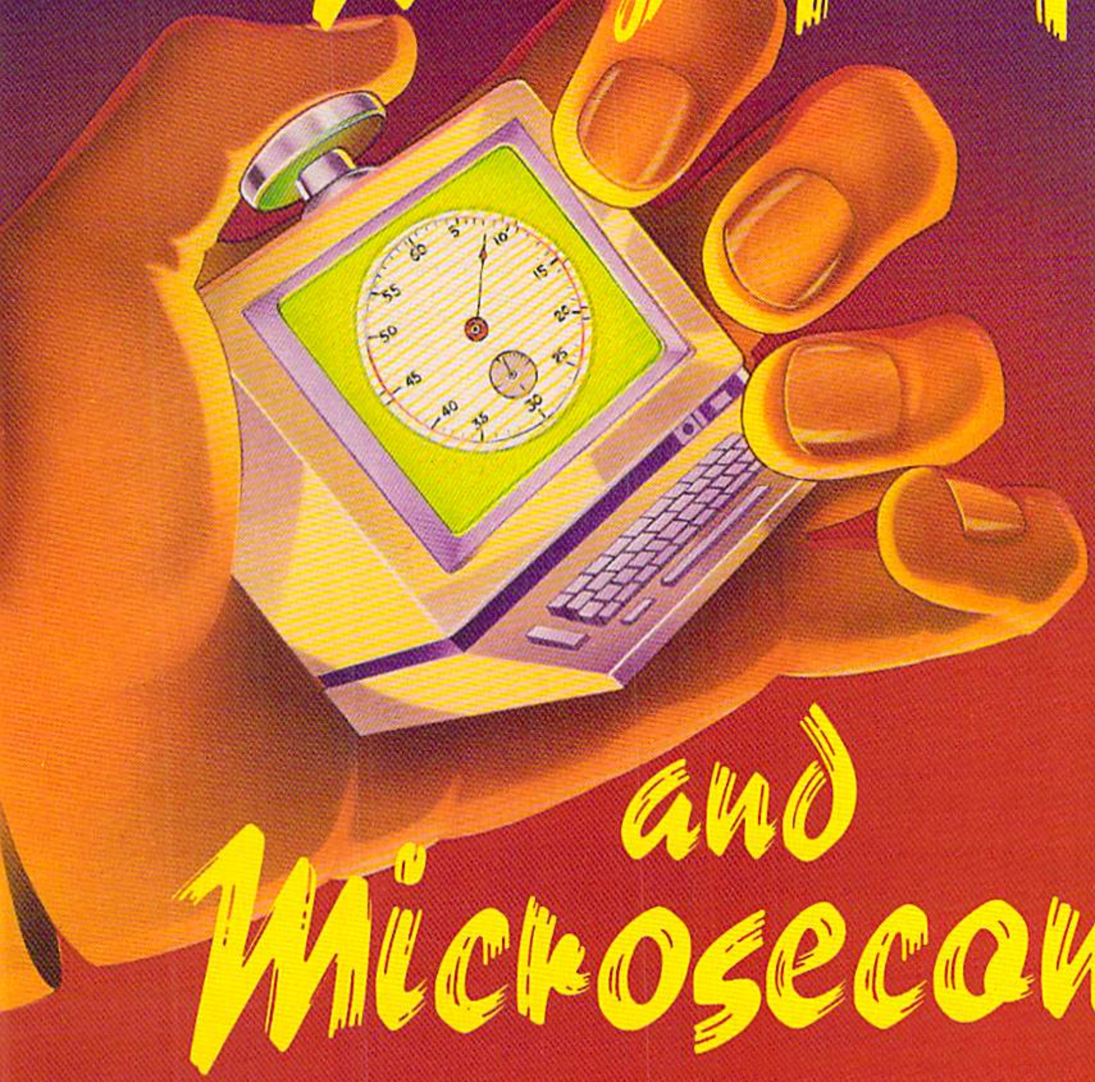
```
10 A=3.21896543 : B=1.02104539
20 T0=TI
30 FOR N=1 TO 1000
40 A=A+B
50 NEXT N
60 PRINT (TI-T0)/60 "SEC"
```

On the C-128 in FAST mode, one thousand additions (as well as the one thousand executions of the NEXT statement) take just under 3 seconds. Change the "+" to "*" in line 40 and try 1000 multiplications. The computer effortlessly screams through 1000 floating point multiplications in just under 4 seconds. (All times on the C-128 in SLOW mode or on the C-64 will be roughly twice the values given for the C-128 FAST mode.)

From this simple test, we can estimate a megaflop rating for BASIC on our computer. "Megaflop" stands for "Mega (million) FLoating point OPerations." Computers are sometimes specified in "megaflops per seconds." The C-128 did 1000 floating point operations (as opposed to integer number operations) in roughly 4 seconds. That corresponds to 250 "flops" per second, which is 250/1,000,000 megaflop per second. So 128-interpreted BASIC has a rating in the neighborhood of 0.00025 megaflop per second!

Rather than trashing the machine for such a miserable score, you might calculate your own brain's megaflop rating. It took me 80.7 seconds with paper and pencil to do the first five additions which were performed by the program above. That comes out to (let me get my calculator

Megaflops and Microseconds



By Dale Rupert

here) 0.000 000 062 megaflop per second, or, lest we damage our egos, a whopping 62,000 microflops (million*ths* of a flop) per second! For numerical calculations, I think I'll hang onto my computer.

The big boys such as the Cray and the CDC supercomputers have megaflop ratings comparable in magnitude to their megabuck prices. For example, an article two years ago listed the Cray 1S at 23 megaflops and 11 megabucks. Don't take these values as absolutes since they were for a specific configuration and application, but they do put our numbers into perspective.

Two years is a long time in electronics. An integrated circuit chip-set was recently introduced claiming a 60 megaflop rating. The two chips cost just over a thousand dollars. Of course the computer to be built around them will cost some money, but the trend to denser and faster components is obvious.

IN A JIFFY

Everyone knows that computers perform mathematical

ILLUSTRATION: SEAN DALY

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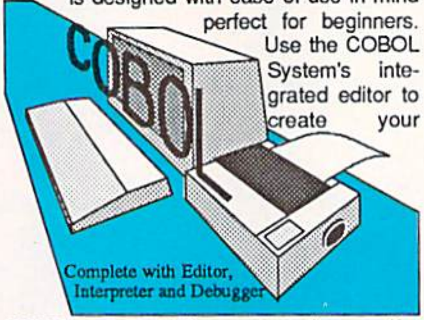
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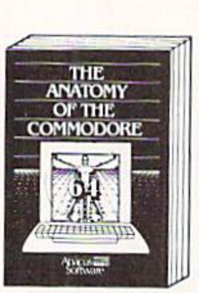
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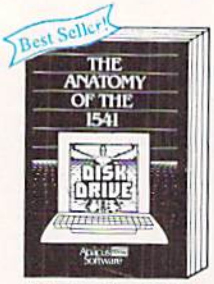
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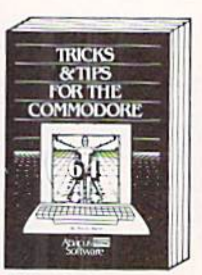
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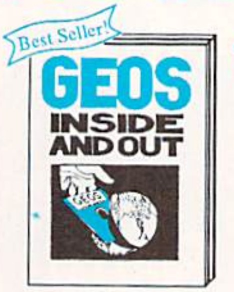
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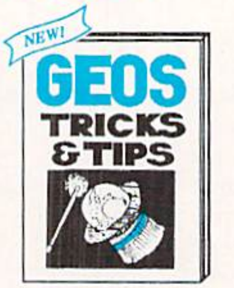
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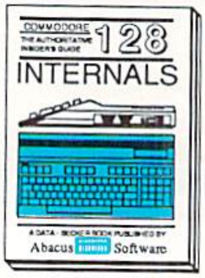
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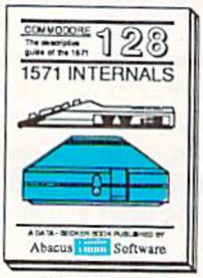
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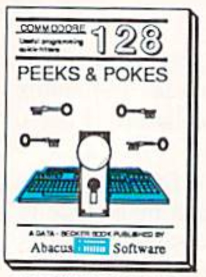
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operations quickly. Our goal is to get an even deeper understanding of how fast computers are in relation to human-level phenomena. In the previous program, we used the jiffy clock to measure times. It measures 60th of a second. Let's consider what types of physical phenomena happen in 60ths of a second.

For one, the video screen attached to your computer is rewritten in 2/60ths of a second, or every two jiffies. (European standard screens are redrawn in 2/50ths of a second.) The glowing phosphors fade away when they are not refreshed. Although the pixels are continuously flickering, your eye and brain respond slowly enough that the characters look solid.

On special monitors with low-persistence phosphors, the images fade more quickly than on normal monitors. This makes them more suitable for light pens which depend upon seeing the rewriting and fading of the pixels. The image on these monitors can shimmer under some conditions. This is a result of your eye/brain almost being able to see the fade-out and refresh.

Actually we do not see events which occur more rapidly than roughly 20 or 30 times per second. That is the basis upon which movie projectors are designed. Move your hand rapidly in front of your eyes. The transparent image proves that the hand is quicker than the eye.

Your peripheral vision is especially acute for seeing rapid changes. Have you seen the light emitting diode (LED) digits of an alarm clock out of the corner of your eye appear to flicker? Those LEDs are typically multiplexed, which means that only one digit is on at a time. Since each digit is turned on once a jiffy or so, the display looks continuously bright to the eye.

Experiment with moving the clock rapidly back and forth in a darkened room. (Close the door so you don't have to try explaining to someone else what you are doing.) At certain rates you can readily perceive the flickering of the digits. You don't see a continuous streak of light from the single-LED alarm indicator as it is moved, for example. Instead you see discrete light pulses each time that LED is illuminated. Your movement of the clock causes the LED to be in a different spot each time it comes on.

One other common phenomena which occurs in jiffies is an electro-mechanical occurrence known as switch bounce. When you press a button on your joystick, the switch closes, completing a circuit into the computer. As the switch contacts spring together, they have a tendency to bounce or vibrate against each other until they finally come to rest.

Anyone who has used one of the original TRS-80 Model I computers is well aware of switch bounce. Every press of the keys on that computer usually produced duplicates or triplicates of the desired character. The solution to the problem was first to load a software patch (remember KBFIX?), after which everything worked fine.

The patch caused software to read the state of each switch over a longer time period before concluding that the switch was open or closed. Keep in mind that switch bounce is a jiffy-long occurrence. Jiffies are eons to the computer operating in microsecond time intervals.

Keep in mind that a jiffy is 1/60th of a second, which is roughly 16.7 thousandths of a second or 16.7 milliseconds. For rough figures, switches may bounce (open or close) several times within a jiffy or two after being pressed.

Although BASIC can be used to time its internal operations in jiffies, a BASIC program is not really fast enough to detect switch bounce accurately or to measure other events which last less than a jiffy. The program *Jiffies* on page 85 shows how quickly BASIC can respond to your joystick finger. Plug a joystick into Port 2 and run this program. The program loops until you press the joystick button. Then, as long as the switch contacts are closed, a "0" is displayed on the screen. When the button is released, the duration of the switch closure is shown in jiffies and in seconds. This process is repeated until you press RUN STOP.

Look at the number of 0's and the corresponding times. A "normal" press of the button takes on the order of 5 jiffies which is 0.083 seconds or 83 milliseconds. Notice that BASIC is able to repeat line 40 several times in the instant that you hold the switch closed. A quick tap on the button may produce a single "0" and a time of 0 jiffies. In such a case, the program may actually be seeing the switch bounce.

Once you have a feeling for the time scales (that is, how many 0's per jiffy), run the second part of this program. To do so, add line 25 GOTO 100. Again the program loops until you press the button initially. After the first press, the screen gives a continuous display of the state of the switch.

Tap the button repeatedly and look closely at the groups of 0's. In a few of them you may see something like a 01000 pattern indicating that the switch closed briefly (the first 0), bounced open for an instant (the 1), then remained closed for the remaining 0's.

Of course the numbers of 0's depends upon the switch closure and speed of your computer. The number of bounces depends upon the quality of your joystick button. You might try experimenting with various types of joysticks or other switches plugged into the joystick port. For serious work, we need a program with much higher speed and resolution. On to assembly language.

NOW FOR SOME REAL SPEED

We saw that BASIC can measure events as quick as a

ERRATUM

Infoflow (April 1987)

A bad subscript error in line 1000 prevented the user from entering or adding new records. Reenter the line as follows:

```
1000 A=L%(X)+1:IN$=" ":GOSUB1570:IF
IN$<>" "THENR$(CR,X)=MID$(IN$,2)     DG
```

We apologize for any inconvenience caused by this error. Remember that corrections to *Ahoy!* programs are available on the *Ahoy!* Bulletin Board (718-383-8909—modem required) and on the *Ahoy!* sections of QuantumLink and PlayNET—as well as by calling 212-239-6089 (if busy or no answer after three rings, 212-239-0855).

few jiffies. Assembly language programs are used for making measurements down to a few microseconds or less (that is, *millionths* of a second).

The commented machine language monitor listing *Bounce. Mon* on page 86 defines a program which operates similarly to the second part of *Jiffies* that we just discussed. *Bounce.Mon* loops in lines 36 and 38 until the button of the joystick in Port 2 is pressed. Line 36 compares the byte at address $DC00 ($ signifies hexadecimal notation) with the value in the accumulator. $DC00 is the address of the interface chip (the "6526 Complex Interface Adapter #1," to be precise) into which the Port 2 joystick switches are brought. The *Programmer's Reference Guide (PRG)* lists bit 4 of this byte as "Joy #1 Fire Button," but it actually belongs to the joystick plugged into Port 2.

The accumulator is loaded with the value $10 which is a bit mask to look only at bit 4. In binary, $10 is 0001 0000. Since the right-hand 0 is bit 0, the 1 corresponds to bit 4. If the bit mask in the accumulator does not match the byte read from $DC00, BNE (Branch if Not Equal) in line 38 branches back to line 36.

Once the button is pressed, bit 4 of $DC00 is set to a 1, the BIT test passes and sets the zero flag, and the BNE instruction allows the program to "fall through" to line 46.

Line 46 starts the main loop which is executed 768 times. The Y register is initialized to 0 in line 24. Each time through the main loop, Y is incremented by 1. After Y has a value of 255, the next increment in line 66 brings it back to zero. Whenever this happens, the BNE instruction in line 68 sees the zero flag set, so the program falls through to line 70, rather than going back to the start of the main loop at $13E3. (Program addresses are in the second column of numbers of this listing.)

Line 70 increments the value stored in zero page memory location $FC. This value was initially set to 4 in line 20. When the value of $FC reaches 7, CPX (Compare with the X register) in line 76 sets the zero flag so that the program falls through the BNE in line 78 and returns (RTS) to BASIC.

Now it is possible to see that the main loop is executed 768 times. $FC takes values 4, 5, and 6 before the program ends. The Y register cycles from 0 to 255 for each value of $FC. Three outer ($FC) loops times 256 inner (Y) loops totals 768. So what exactly is happening 768 times?

In line 46 the bit 4 mask is stored in the accumulator. Line 48 tests the fire button bit of the joystick port. If the button is pressed (the switch contacts are closed), BEQ (Branch if EQual) jumps to line 56 where an ASCII "0" is put into the accumulator. If the contacts are not closed, line 52 puts an ASCII "1" into the accumulator and jumps to the real action at line 60.

The two-byte address stored in zero page locations $FB and $FC is either $0400, $0500, or $0600 since $FB contains a zero and, as we saw, $FC is incremented from 4 to 6. Address $0400 corresponds to the upper left corner of the 40-column screen. The Y register keeps track of the next available screen location. The STA ($FB),Y instruction in line 60 says "take the address stored in the two bytes beginning at location $FB, add the value in the Y register to that address, then store whatever is in the accumulator at the resultant address."

The first character (0) in the accumulator is stored at address $0400. The next one (0 or 1 depending upon the state of the fire button) is stored at $0401. These are the first two screen locations. When Y gets up to 255 ($FF), the accumulator value is stored at $04FF (1279) which is in the seventh screen line. Then Y is incremented to 0, $FC is incremented to $05 and the next screen location to be written is $0500 (1280).

You may load and run *Switch Bounce* on page 86 which puts the machine language code into memory, gives instructions, and displays the switch contact status each time the fire button is pressed. As we will see shortly, each 0 and 1 corresponds to the state of the switch every 26 milliseconds or so. The full display gives approximately 20 milliseconds' worth of data. To exit the program, you must hold the RUN STOP key while you press the joystick button. Key bounce should be much easier to identify with this program than with the BASIC version.

HOW FAST?

We've seen how the program works. How long does it take the computer to execute this loop 768 times? One way to find out is to add up instruction clock cycles. Each machine language instruction is executed in an integral number of clock cycles. These numbers are summarized in the *C-128 PRG* on page 178 and in the *C-64 PRG* on page 254. The numbers are shown in brackets in the right-hand column of *Bounce.Mon*.

First, a few words about clocks and cycle times. The C-128 in SLOW mode and the C-64 operate with a clock frequency of 1 megahertz (1 MHz). This means that the oscillator which causes the microprocessor to sequence through its instructions "ticks" one million times per second. The time between ticks is called the clock period or the cycle time.

For the C-64, the clock period is 1 microsecond. There is one millionth of a second between ticks. The C-128 in FAST mode is twice as fast, operating at 2 MHz with a clock cycle time of 0.5 microsecond. Times less than a microsecond are measured in nanoseconds (billionths of a second). The cycle time of the C-128 in FAST mode is 500 nanoseconds.

To determine the execution time of the machine language program, we only need to look at the instructions within the main loop. The instructions outside the main loop don't contribute a significant amount to the total program time. We will calculate the total time for the instructions in lines 46 through 68, since all of them are executed 768 times. Lines 70 through 78 only occur three times and the others only occur once, so they can be ignored.

The conditional branch instructions in lines 50 and 68 show cycle times of 2 or 3. If the branch occurs, the processor needs an extra cycle time to calculate the next instruction address, so the branch instruction takes 3 cycles. If program execution falls through the branch instruction instead of branching, the instruction pointer already points to the next instruction address without any further calculation, so the branch instruction takes only 2 cycles.

For rough estimates, we may assume that the BEQ at line 50 will fall through half the time and branch half the time, giving an average cycle time of 2.5. The BNE in line 54 always branches since the zero flag was cleared by the LDA

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Reader Service No. 261

#$31 instruction in line 52. It takes 3 cycle times. The BNE in line 68 branches 255 out of 256 times, so we will assume 3 cycle times for it.

There is a total of 26.5 cycle times in the main loop with these assumptions. Multiply that by 768 times through the loop giving 20,352 cycle times for the program. (If you want to toss in the 50 or so additional cycle times we ignored, go right ahead. The 0.2% difference is not significant.)

The C-128 in FAST mode takes 20,352 times 0.5 microseconds which is roughly 10.2 milliseconds (20,352 × 0.5E −6 = 10.2E−3). Since this program uses the 40-column screen, it must be run in SLOW mode. Even then it takes just over 20 milliseconds to run.

Think about that for a moment. BASIC was able to perform its one-line loop about 2 or 3 times in one jiffy (16.7 milliseconds). This machine language program is performing a comparable loop 768 times in just about the same amount of time.

The machine language program takes 26.5 cycle times per character on the screen. At 1.0 microsecond per cycle time, that amounts to 26.5 microseconds (26.5E−6 seconds) per character. The reciprocal of this gives nearly 38,000 characters per second.

We are approaching mind-boggling time scales. The computer is reading the joystick port and displaying its status at a rate of 38,000 times per second. Not a dozen, or a few hundred, but thirty-eight thousand times per second. It is exhilarating, to say the least.

Every push of the fire button causes the 768 data values on the screen to be redrawn. The entire picture of 0's and 1's on the screen represents a mere twenty thousandths of a second's worth of data. But, as they say at the circus, we ain't seen nothin' yet.

BEYOND COMPREHENSION

Physicists are developing electronic switches such as transistors which can switch on and off in picosecond (trillionths of a second) time periods. Most of that work is still highly experimental, using exotic materials at exotic temperatures and pressures. On the other hand, timing accuracies measured in nanoseconds (billionths of a second) are a common consideration of electrical engineers designing circuits such as your Commodore computer.

To see that nanosecond times are important in the design of your computer, look at the timing diagrams for the 6581 SID chip shown in the *C-128 PRG* on page 606 and in the *C-64 PRG* on page 476. The Read Cycle timing diagram shows the relations between various signals associated with the SID chip. Notice for example that the Address Hold Time TAH has a minimum value of 10 nanoseconds.

This means that the electrical engineer designing the circuit board must guarantee that address lines A0-A4 are still valid at the SID chip at least 10 nanoseconds after the system clock (on the top line of the diagram) has gone low. Evidently the SID chip guarantees that the data it is sending to the processor is valid only if those address lines remain unchanged for that amount of time.

The SID as well as all other readable devices such as RAMs and ROMs have guaranteed access times. This is specified as TACC in the Read Cycle table to be a maximum of 300 nanoseconds. The processor must wait at least 300 nanoseconds after selecting the SID before it attempts to read data from it.

Just putting a faster clock into a computer won't necessarily increase the speed of the computer. If the memory and I/O devices have slow access times, they can't provide their data to the processor quickly enough, and the computer simply won't work.

We will conclude with a couple of examples which may help you to gain a better appreciation of nanoseconds. Just how small a time interval is a nanosecond? Well for starters, there are as many nanoseconds in one second as there are seconds in 31.8 years. Imagine dividing nearly 32 years into seconds. Each second is one-billionth of the total time. Measuring events over a one-second time period with one nanosecond resolution is proportion to tracking events over 31.8 years with one-second resolution.

Consider light which can travel seven and a half times around the earth in one second (186,000 miles per second divided by the circumference of 25,000 miles). A nanosecond is such a short period of time that light travels less than one foot per nanosecond (186,000 miles per second times 1E−9 second times 5280 feet per mile equals 0.98 foot). Nanoseconds are short.

The next time you are idly waiting for your computer to finish a calculation, focus your thoughts down to the nanosecond level. Imagine what must be happening in that computer to make it take so long. ☐

SEE PROGRAM LISTINGS ON PAGE 85

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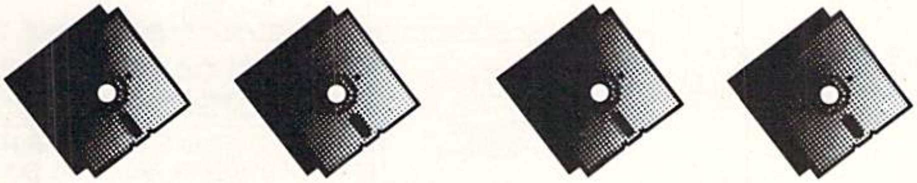
D-SNAP

A Sector Editor for the C-64



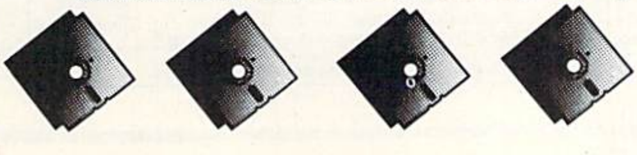
By Tim Little

This program won't be the last disk utility you'll ever use, just the most important one. The display format is the most efficient I've seen from an ease-of-use standpoint. The editing system is cursor controlled, with a constantly updated parameter area in the middle of the screen which displays all the critical information a real disk surgeon would require for those touchy operations.

Using this program you can modify and view any block of a standard GCR formatted diskette. First I must stress two major points: 1) Use this program on a backup of the disk you want to edit. 2) If you are not familiar with the format of the 1541's file structure, either pick up a book on the subject (I recommend *Inside Commodore DOS)* or give this program and your diskette to someone who is more familiar with such formats.

COMMANDS

R	Read a block. This option will ask you for a track and sector coordinate on the diskette and will read that block if it is a legal track and sector; otherwise, you will be back at the same block you started on.
W	Write a block. Works the same as above, except this option writes to your diskette.
+	This option will read the next consecutive block from the diskette. The program will advance to the next track if the present sector is the highest sector for the present track. The program takes into account the varying number of sectors per track group.
–	This option will read the previous block, with the same basic rules as above.
N	Next F-Link. This option will try to read the next block in your file, and will stop you if it can't go any further than the present block. The first two bytes point to the next track and sector in the current file.
J	Jump Cursor Link. This option will try to read the track and sector link from under the cursor. It will, as usual, prevent you from reading an illegal block, and will be further explained below.
Space	Reread the current block. This option will reread the block back into the buffer, thus negating any changes you may have made.
?	Print the current block. This option will print the current block to the printer (or device #4).
*	New Screen. If by some quirk of nature your screen goes awry, just select this option to reset your screen.
@	Enter DOS Command. This will let you enter any DOS housekeeping commands such as VALIDATE, RENAME, etc. But I have disabled the USER and BLOCK commands, as I saw no use for them in this program. Any attempt to NEW the diskette will be safeguarded by a YES/NO query type prompt. And in the normal DOS tradition $ will present you with a normal directory. If you enter '@' for the com-



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mand the program will just display the error channel.

$ Directory. This is a normal (if somewhat slow) directory. It can be aborted by any keystroke.

C Change byte. This command will let you change the byte under the cursor. It will first ask you whether you wish to enter your change in hexadecimal or decimal. If you ask for hexadecimal, no carriage return will be needed at the end of your entry.

S String Entry. This option is used to change a large group of bytes, such as a filename, to any string the user specifies. You will first be asked whether you wish to use unstripped or normal ASCII. I cannot tell you which you will need, so I provided both. Unstripped is normal text with the highest bit set, while normal is precisely what is entered from the keyboard.

Q Quit Program. This will exit the program but keep it in memory, and retain the screen colors. You must enter a SHIFTED Q in order to exit the program. Just type GOTO30 to get back into the program, then get a NEW SCREEN with the '*'.

BRIEF NOTES

In the interest of space, I will not repeat what has been said in many past articles on file structure. I will instead concentrate just on what you will need to know to use this program.

When the program is first run, it will read track 18, sector 00. Then it will print loads of what seems to be gibberish in the top third of the screen. Then the program will place the cursor (white character) and display the value under the cursor in hexadecimal and decimal, as well as the character representation, and of course the byte position number.

Since the cursor is on the first byte in the block, a Jump Crsr Link and a Next F-Link will perform the same action. The Jump is used mainly on track 18 in the file directory entries (see the 1541 or 1571 Users Manual for specifics on this subject). If you have used Next F-Link to trace through a file and have come to a block with a next file track pointer of zero, you will most likely have encountered the last block of the file. The place where you usually find the next sector pointer now tells you the number of valid data bytes in the block. If the last three valid bytes are zeros, you were probably reading a BASIC program file.

One last pointer (no pun intended) before I leave you to your defenseless disk: the load address is the first two bytes in the file after the two byte pointer to the next block in the file.

Now you're ready for accidental deletions, unintentional short-NEWS, and maybe even READ errors. ☐

SEE PROGRAM LISTING ON PAGE 93

128
MULTI RAM

By Buck Childress

Oh, the joy of having split personalities—in your computer, that is. Being able to split the RAM into separate sections, or "computers," can be extremely useful, especially if you like to bounce from program to program. I did this for the 64 back in the September '86 *Ahoy!* Now it seems the 128 is begging for the same treatment. And, with all that RAM, it definitely deserves equal time.

128 Multi RAM gives your 128 some very helpful split personalities. Normally there are 58,109 bytes free in BANK 0 where BASIC programs are stored. If you're like me, most of your programs are so small by comparison to all that RAM, they're like a cork bobbing around in the ocean. The chances of overcrowding are definitely slim to none. Let's split this area in three. This gives you two areas of RAM containing 19,453 bytes each and a third area with 19,197 bytes. Each area has almost 8000 more bytes than the Commodore 16.

You'll also have access to the free area of RAM at 4864. Normally you can't store your BASIC program here. That's unfortunate because there are more than 2300 additional bytes in this area. *128 Multi RAM* opens the door and makes this area of RAM available to BASIC. That is a great place to store your smaller programs or subroutines. If you're using a disk drive, you can keep your disk directory here for reference.

In essence, you now have four computers in one. All four work independently of one another. This is really handy when you're working on a program. For example, maybe you have a subroutine stored in one area and want to append it to a program residing in another. Just list the routine, switch to the RAM containing the target program, cursor up, and press RETURN on each line of the routine. When you list the program, you'll see the routine tacked on.

After saving a copy of *128 Multi RAM*, run it. The loader POKEs the machine language data into memory and checks for errors. *128 Multi RAM* then activates itself and erases the BASIC loader. If for some reason you want to disable *128 Multi RAM*, press RUN STOP/RESTORE. SYS 3072 will reenable it.

Press the CONTROL and F1 function keys at the same time. At the top of your screen you'll see:

```
RAM = 1 *** BYTES FREE = 19453
```

This is the bottom third of BASIC RAM. As you can see, the bytes free are also displayed. The number will change when you put something in memory. Now press the CONTROL and F3 keys. You'll see:

```
RAM = 2 *** BYTES FREE = 19453
```

You're now in the middle third of BASIC RAM. CONTROL and F5 places you in the top third of BASIC RAM:

```
RAM = 3 *** BYTES FREE = 19197
```

CONTROL and F7 gives you access to the free RAM area at 3072:

```
RAM = FREE *** BYTES FREE = 2301
```

If you want to use the entire BASIC RAM area at once, press CONTROL and RETURN:

```
RAM = NORMAL *** BYTES FREE = 58109
```

All of BASIC RAM is now available to you.

Pressing CONTROL and the space bar serves two purposes. You can press them whenever you want to check the bytes free for the area you're in. And, since the current RAM area is also displayed, you can use them if you happen to forget what area you're using.

You can access any area as often as you like. Whatever area of RAM you're using, everything you do (loading, saving, running, newing, etc.) will take place in that area. You can even save a program from one area and load it into another.

If you run any program, be sure they don't POKE data where *128 Multi RAM* is working—from 3072 to 3448. Also, the GRAPHIC command alters the memory configuration in the 128. If you run a program that uses the GRAPHIC command, be certain that it executes a GRAPHIC CLR before ending.

Because *128 Multi RAM* monitors certain pointers and continually updates various data to reflect the status of these pointers, don't load and run it again (unless, of course, you turn the computer off). This is why *128 Multi RAM* activates itself and erases the loader once it's been run. Remember, make sure you have a good copy saved before you run *128 Multi RAM* for the first time.

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SEE PROGRAM LISTING ON PAGE 97

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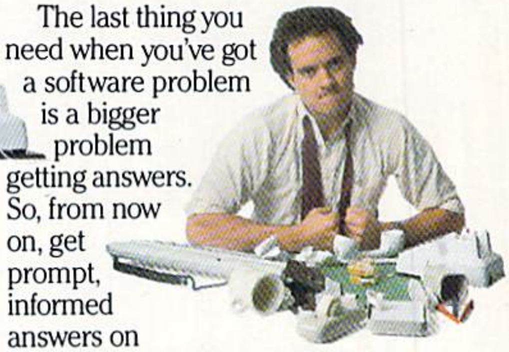

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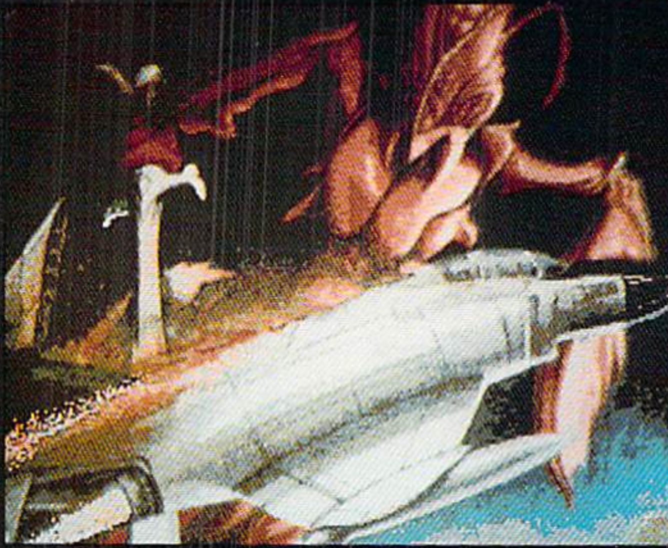
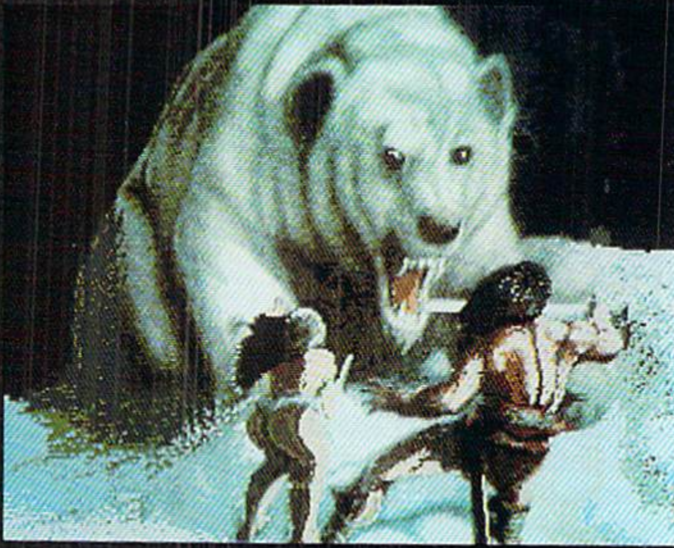
ART GALLERY

You C-64/C-128 artists who wrote, called, and wired us in panic the last time we ran an all-Amiga *Art Gallery* (July '86) are doubtless preparing to do it again. But as this is only the second Amiga *Art Gallery* since the computer's introduction, we think it's clear that your worst fears were unfounded—this section has not been turned over to the unfairly advantaged competition. Looking at the quality of this month's images, however, we don't know how much longer we can hold out!





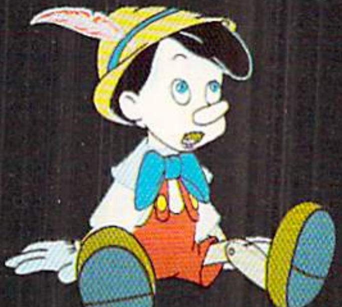
Art Gallery Disk Sale

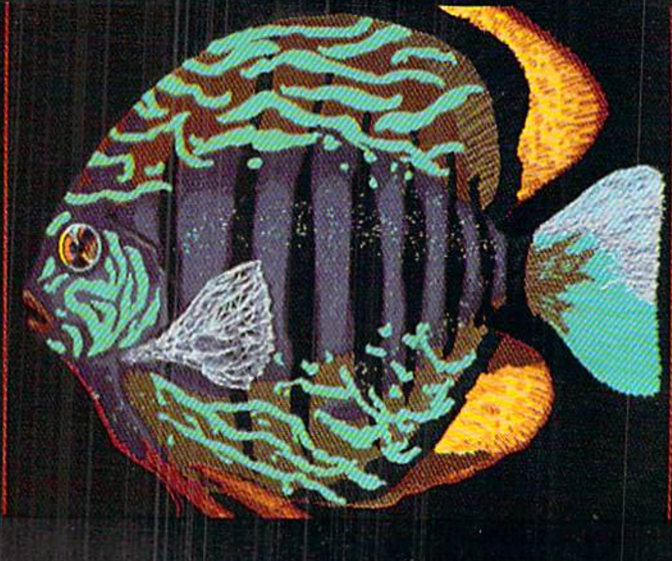
The images on these pages are now available on a monthly disk. Multicolor images are supplied in *Koala* format, while high-resolution images are in *DOODLE!* format. Included are a slide show for easy viewing, along with a bit map dump for your 1525 printer or properly interfaced equivalent. A sample *Art Gallery* disk with slide show and printer dumps is $10; or send a stamped and self-addressed envelope (business size) for a listing of available *Art Gallery* collection disks. Prices shown are for US and Canada. All others add $3 per disk. New York State residents please add appropriate sales taxes. Disks may be ordered from Morton Kevelson, P.O. Box 260, Homecrest Station, Brooklyn, NY 11229.

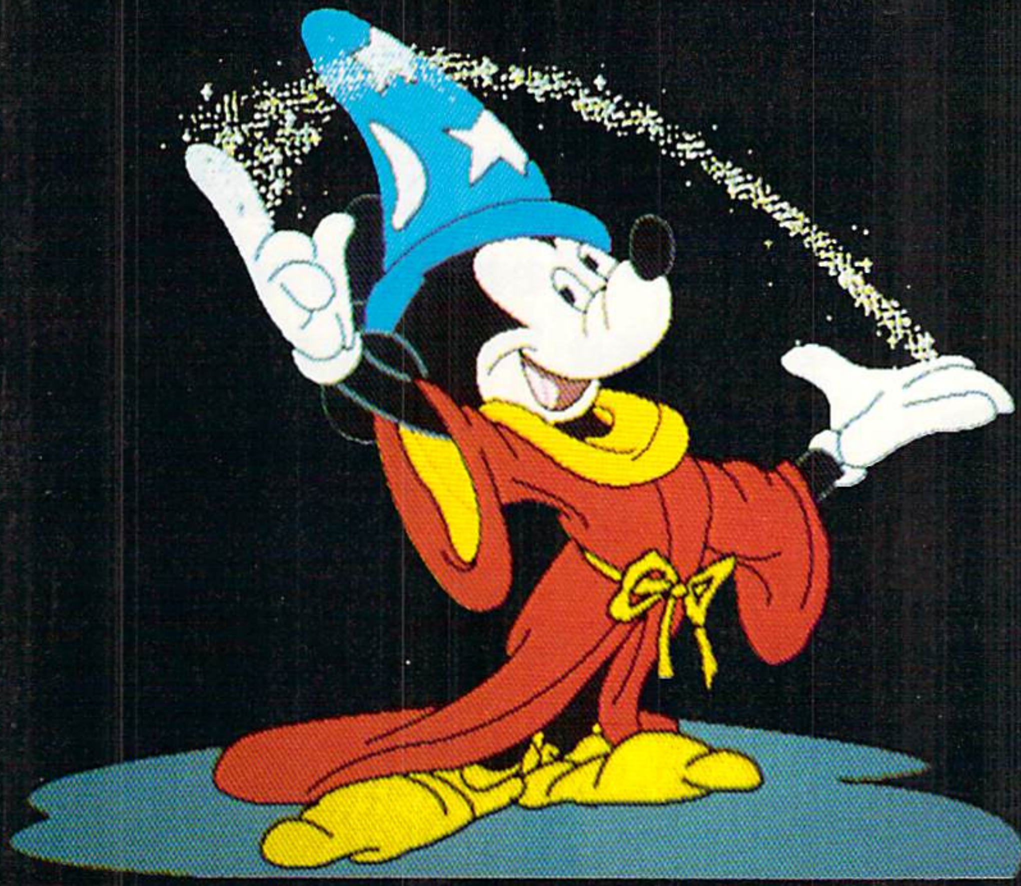
Contribute to Ahoy!'s Art Gallery

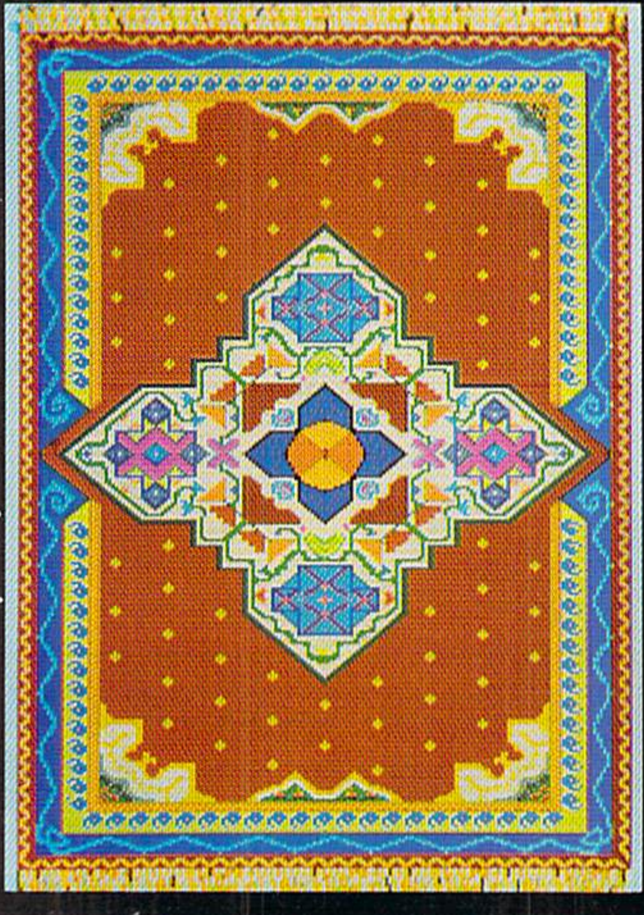
The *Ahoy! Art Gallery* offers the opportunity for fame and fortune to any and all aspiring Commodore artists. Simply send Morton (see address above) your work on disk indicating the drawing package or file format of the images. Inclusion of a self-addressed post card will guarantee an immediate response. All graphics produced on the C-64/C-128, Plus/4, and Amiga computers are eligible. In exchange your work will receive the opportunity for display in these pages. All published works will receive royalties based on the monthly *Art Gallery* disk sales. Also, both published and unpublished images may be included on *Art Gallery* collection disks.

Note that the *Art Gallery* is not a contest. Published pictures are selected in an arbitrary and capricious fashion by the *Ahoy!* Art Director based solely on the artistic merit of the individual images.

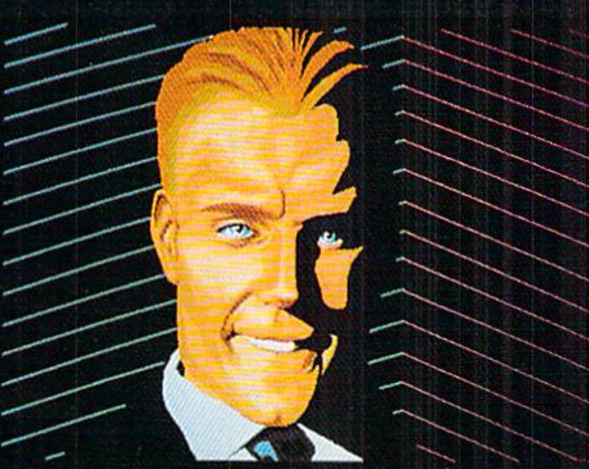








Top to bottom on page 32: *The Bug* and *Conan Bear,* low-res (320 X 200 pixels, 32 colors) images by Fred Dowling (Simi Valley, CA); and *Thanksforallthe,* a hi-res (640 X 400 pixels, 16 colors) rendition by Alisa Lowden (State College, PA)—fans of Douglas Adams' *Hitchhiker's Guide to the Galaxy* series will understand the title; and *Pinocchio,* brought to life in hi-res by Gary Dominguez (Oklahoma City, OK). On this page are a hi-res *Mickey,* also by Gary Dominguez—cf. last month's 64-rendered rodent; *Oriental Rug* by Phyllis A. Foulks (Florissant, MO), drawn in low-res on *Deluxe Paint;* and *Max* by the aforementioned Alisa Lowden. Amiga graphic artists are encouraged to send their best works to Morton Kevelson at the address printed at left for possible future Amiga *Art Galleries.*



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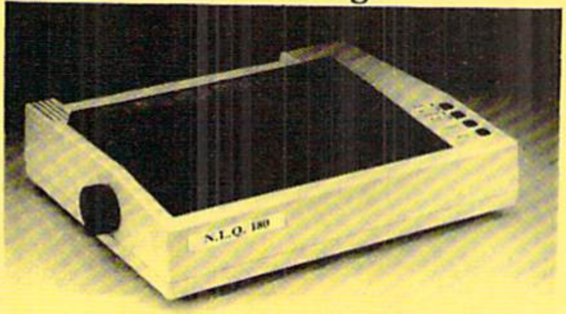

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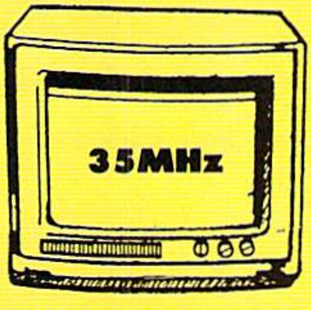

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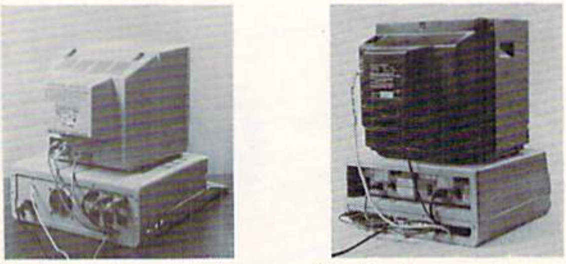

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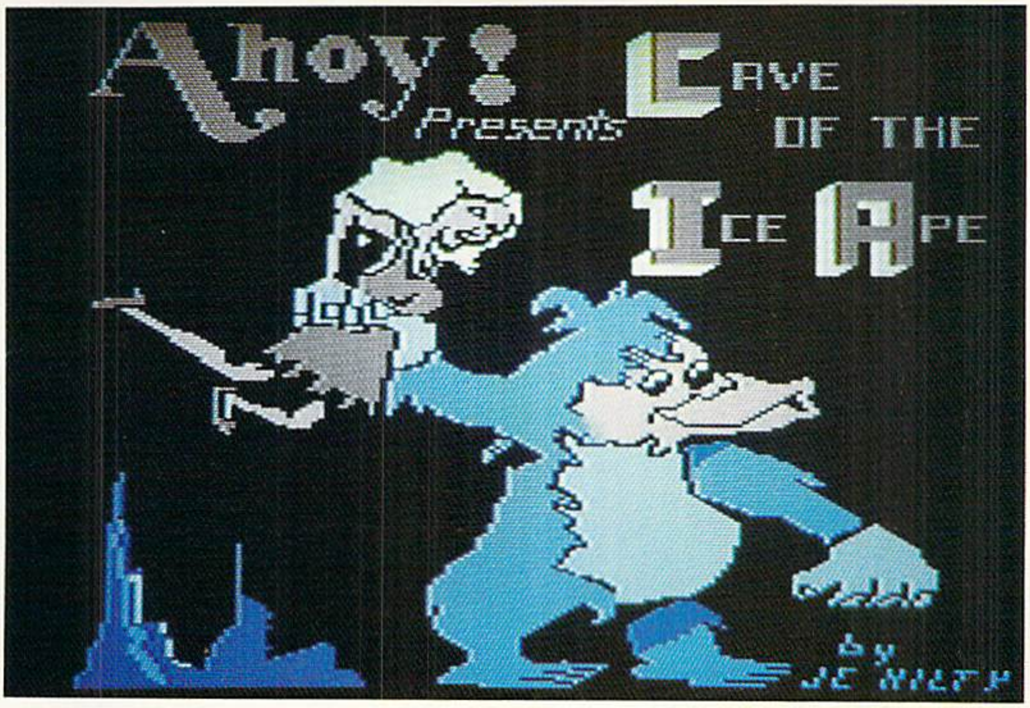

For the C-64

By James C. Hilty

Your search was finally over....

A few months ago your true love, Maxine, left on an expedition to the Himalaya mountains. She was not heard from again. You have searched for her ever since. One day, with the snow blowing and the temperature below zero, you heard a scream coming from a cave. You looked inside the cave to find Maxine—held prisoner by a large apelike creature.

Cave of the Ice Ape is a game for the C-64 which features music, sound effects, and sprite animation. Using a joystick in Port 1, your goal is to rescue Maxine as many times as you can without being hit by one of the snowballs that the Ice Ape tosses down at you. In order to free Maxine, you will need three sticks of TNT. These will appear throughout the cave. Do not run into any portion of the cave, or you will blow up and lose one of the four lives you began the game with (after all, you are carrying TNT). You have only 40 seconds to collect the three sticks of TNT. If you do not collect them within the set time, you lose a life. If you do get the TNT, Maxine shows her appreciation and you receive 100 points. Another rescue attempt follows, only this time the snowballs move a little faster. After each successful rescue, the snowballs pick up speed.

Cave of the Ice Ape consists of two programs. First, type in and save the short machine language program using *Flankspeed* (see page 83) and be sure to save it under the filename APEMUSIC. Next, type in and save the main BASIC program and save it under the name of CAVEAPE. If you are using tape, change the device number in line 692 of the main program from an 8 to a 1. Be sure that the ML program APEMUSIC follows CAVEAPE on the tape. To play the game, load and run CAVEAPE.

The Cave Ape kind of likes Maxine, but he sure doesn't care for you. Dodge those snowballs and rescue your true love, or get blown up trying! ☐

SEE PROGRAM LISTING ON PAGE 89

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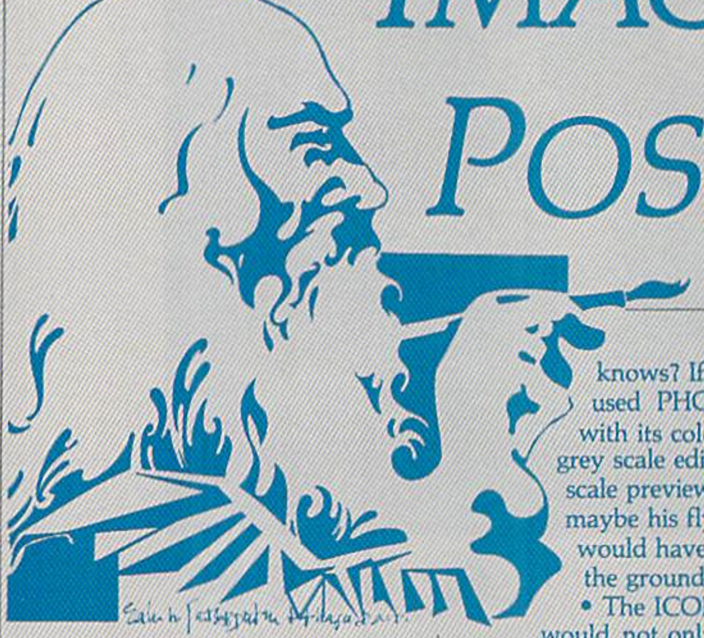

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- The ICON FACTORY would not only have allowed Da Vinci to change his illustrations from picture to graphic and vice versa, he also could have cropped, flipped, enlarged, inverted and overlayed. And with the ICON FACTORY's brand-new *reduce* function he could have reduced his illustrations while maintaining their clarity and definition.

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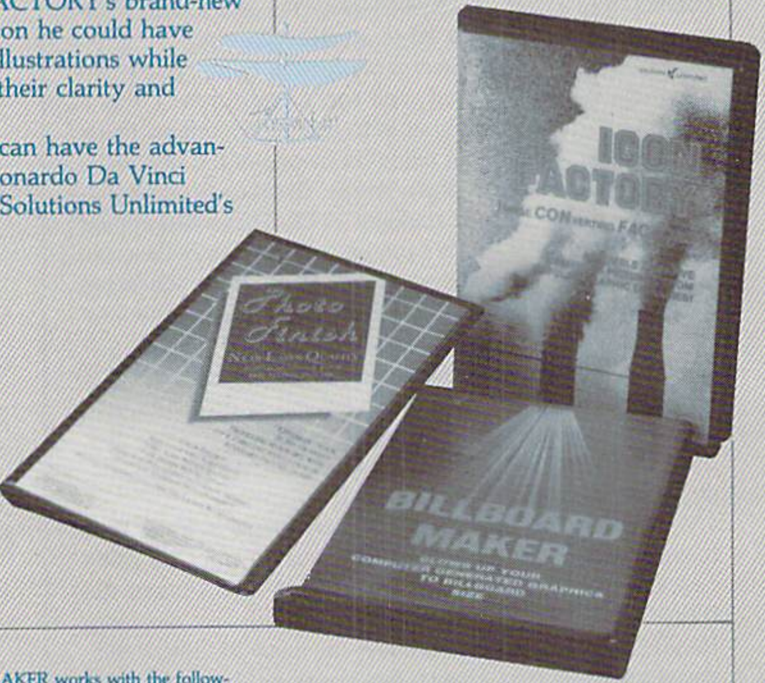

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All of the above require the Commodore 64/128 computer, 1541/1571 Disk Drive and Dot Matrix Printer for hard copy.

Reader Service No. 264

COMAL COLUMN

It's Time to Decide

By Richard Herring

"Slowly he turned and step by step, inch by inch..." No, we're not going to talk about how to write this fiction in COMAL. And though this quote probably is not indicative of how you want your programs to run, it may well be a guide to how you write your code.

What distinguishes a really fine programming language is the ease with which it allows the programmer to work. It's not the trivial features (regardless of how important they are at the instant you need them), like bells and whistles for controlling sprites or musical timing. Rather it is the control given you over the direction, the flow, the logic of your program that gives one language advantage over others.

Providing that kind of control is exactly where COMAL shines. For the next couple of months, we'll talk about control structures in programming languages and see COMAL's simple yet sophisticated abilities.

We all know how ploddingly logical our computers are. (Even if that doesn't apply to the user interface of every commercial program.) Given its druthers, your computer would start at the beginning of any program and methodically process one line at a time, sequentially, until the end.

So as we talk about control structures let's talk about those elements of COMAL that allow you to break–or at least to redirect–your computer's train of thought. To force it to jump to another point in the program: there to continue execution. To choose among several alternatives. Or to run around in circles.

From a macro viewpoint you can write a COMAL program that is purely sequential. It might be just a list of procedure calls, which procedures the computer executes in the order listed. Or perhaps a simple program–the kind we all started with when we proudly instructed our computers to PRINT "HELLO" on the screen for the first time.

This month, with that IRS rebate burning a whole in our pockets, let's look at control structures that let you make decisions. We'll refer to some examples from the last couple of columns so you can go back and see the working context.

COMAL supports two decision-making structures. One makes true/false decisions (IF...THEN). The other selects among multiple choices (CASE...OF/WHEN). Sorry, no fill-in-the-blank or essay.

After the PRINT command, used to get that "HELLO", our learner guides moved us along to structures like IF...THEN. Even in its simplest form, the IF...THEN structure allows us to determine the truth of a logical argument.

IF the argument is true, our THEN statement is executed. IF it is false, our THEN statement is skipped and the program executes the next program line or command. Last month we used a series of IF...THENs in the procedure keyboard'check (lines 210-290) to send the program on to other procedures, like:

```
240 IF sp$="f" then fill'a'space
```

Programming languages that are designed to give you power beef up the IF...THEN construction. COMAL first adds the command ELIF (short for ELSE IF) to the IF...THEN structure. Last month's series of IF...THENs was fine, while the purpose of those commands was fresh in our minds. For a better documented program, however, we could have used ELIF:

```
210 PROC keyboard'check
220  sp$=KEY$
240  IF sp$="f" THEN
245   fill'a'space
250  ELIF sp$="c" THEN
255   save'position
256   circle'draw
260  ELIF sp$="d" THEN
265   save'position
266   draw'a'line
270  ELIF sp$="p" THEN
275   color'of'line
280  ELIF sp$="b" THEN
285   background'color
286  ELSE
287   NULL
289  ENDIF
290 ENDPROC keyboard'check
```

Any number of ELIFs can follow the initial IF...THEN. After a series of ELIFs you can throw in an ELSE to capture all other possibilities so that if none of the tested statements are true you can still do something (or, as in our example, do nothing). And then you must remember to wrap up the whole thing with an ENDIF to tell COMAL that you have completed or closed your IF...THEN structure, which may now be quite long.

You see here that we have taken a simple decision-making structure–either something is true or it isn't–and expanded it to the point where we can choose among a variety of alternatives. This fancy IF...THEN has one additional strength and a shortcoming.

Its strength is that you can test a number of different conditions, not just one. In our program example above, not all of our IFs or ELIFs had to reference the sp$ variable for the last key pressed. Some of them could have read the user port–maybe we'd want an interactive game with two computers wired back to back. Or they could have read screen position, or any number of things. Get too wild with this and your program logic is going to be hard to track.

The downside is that when you are testing the same IF or ELIF condition over and over (as you often will be), your code must repeat that condition and the computer, as it executes that code, must read the condition again and again.

Something like a multiple choice question on a test, where you must reread the question before reading each answer—inefficient. Wouldn't you rather just read the question once, keeping it in your head, then read the answers straight through until you hit the correct one? Me too.

COMAL too. COMAL provides the CASE...OF/WHEN structure to do just that. CASE theoretically gives you the ability to parallel process a number of options simultaneously. The result depends on the value of the expression, not just its truth. We can improve last month's code again (would you believe I planned this?) by scrapping IF...THEN:

```
210 PROC keyboard'check
220  sp$=KEY$
235  CASE sp$ OF
240  WHEN "f"
245   fill'a'space
250  WHEN "c"
255   save'position
256   circle'draw
260  WHEN "d"
265   save'position
266   draw'a'line
270  WHEN "p"
275   color'of'line
280  WHEN "b"
285   background'color
286  OTHERWISE
287    NULL
289  ENDCASE
290 ENDPROC keyboard'check
```

The key improvement here is that the computer has to read only once the initial expression against which it will compare all subsequent values. And the flow of the code will be clearer if we pick this program up again in a year.

As with the IF/ELIF construct, once the computer hits a value that is true it will process the corresponding WHEN or ELIF statement, then jump to the end of the entire CASE or IF...THEN structure. Subsequent values, whether true or not, will not be tested. (Looking at last month's program, you'll see the save'position procedure call, line 230, had to be moved to lines 255 and 265 for this reason.)

You will usually need more than one decision-making structure in your program. You can design your program so that your IF...THEN and CASE structures are separated, sequential, or nested. By nested I mean that an IF...THEN can be the statement that follows a WHEN in the CASE structure. Decisions within decisions. The complexity can be compelling, but good programmers limit themselves. The most complicated decisions imaginable can and should be handled with nested structures no more than three deep.

Next month we'll go in circles. I'm writing this column in February, just weeks after the first *COMAL Column* appeared in the March *Ahoy!*, and already I've received several letters with interesting hints and insights. Send me your favorite tricks and I will try to compile them into a future column—with all due credit given to the sender. Write me directly at P.O. Box 1544, Tallahassee, FL 32302. ☐

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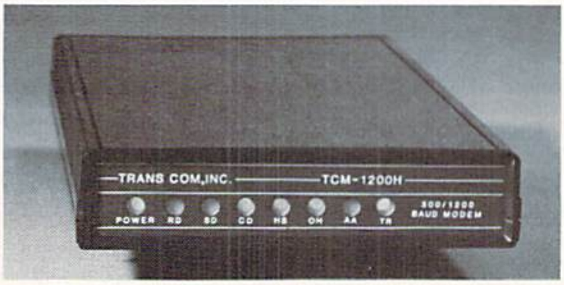

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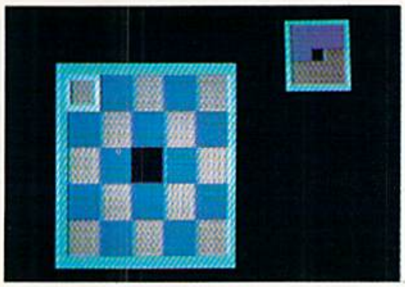

For the C-64

By John Fedor

This mind-boggling Commodore 64 strategy game is for one or two players. You push one colored square into a vacant area, trying to set your pattern before your opponent does the same. Since you both work on the same grid, you can undo each other's work quite easily. You play on a 5 × 5 grid with 12 blue squares, 12 red squares, and 1 vacant square. Each player (except the computer) uses a joystick to control the flashing cursor. Press the fire button to choose the square you wish to slide into the vacant area. No diagonals are allowed, and the square chosen must be in the same X or Y plane as the vacant square and must be that player's color.

STRATEGY HINTS

Although the mechanics of the game are simple, winning can be quite difficult. Here are a couple of tips to ease the frustration of the game:

1) Help each other out at the beginning of the game. At least finish the back row in your color.

2) Although you may help each other out, plan your moves. Do not make rash decisions. You may later realize that there was a better alternative.

SPECIAL FEATURES

The first noticeable feature is the flashing cursor. It actually pulsates in hues of blue to add visual appeal. The colors go from white to cyan, cyan to light blue, light blue to blue, and then back again.

Another nice touch is the small grid in the upper right hand corner showing how the squares must be placed in order for a win to occur. Only one color must be put in that arrangement for the win. The grid helps you decide where you are headed.

The computerized player(s) is a nice feature. Although randomized, it is a tough opponent. The cursor shows which square it is currently looking at. A restriction was put on the computer so that it would not repick the same square and undo its previous turn. This speeds the game up and makes it less frustrating to play against the computer.

With these special features built in and used during play, a simple strategy game becomes very entertaining. ☐

SEE PROGRAM LISTING ON PAGE 92

PHOTO: MICHAEL R. DAVILA

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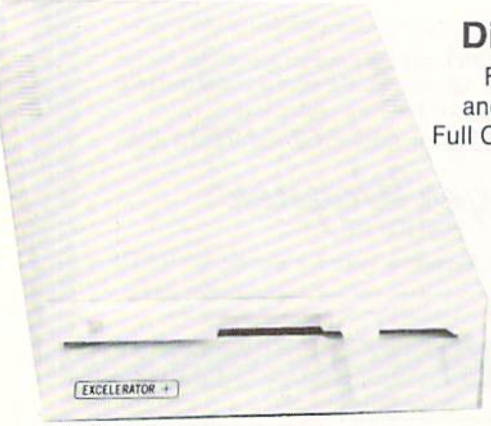

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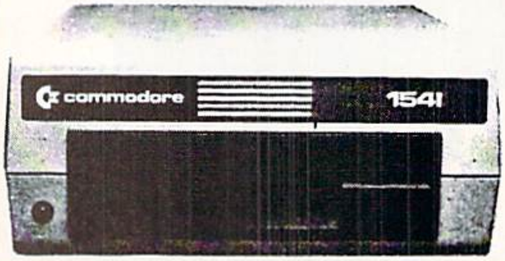

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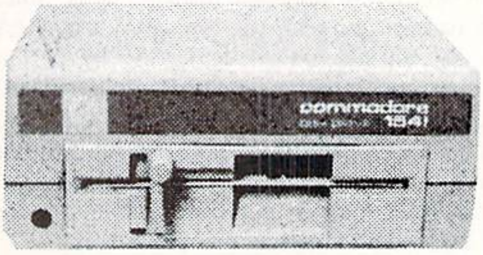

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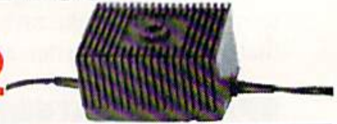

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ENTERTAINMENT SOFTWARE SECTION

STRATEGY IN OUTER SPACE
Science Fiction Braingames for the Commodore

By Arnie Katz

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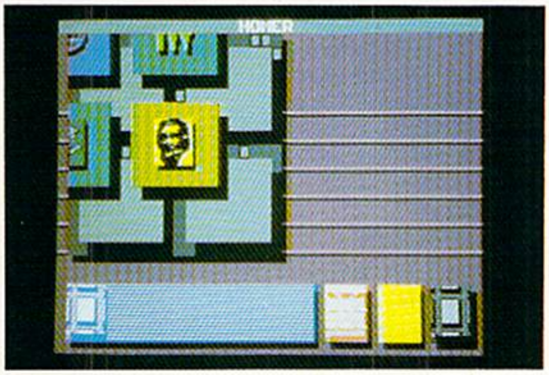


Portal *is more of a novel than an adventure.*
READER SERVICE NO. 220

Computerists have always shown a special affection for science fiction. Speculation about the nature and consequences of tomorrow's marvels comes naturally to the computer community. Who could appreciate the potential impact of science more than people who have turned the "electronic brain" of the pre-World War II pulp magazines into a household appliance?

S.F. games are almost as old as computer entertainment itself. Even before Nolan Bushnell marketed the first coin-op, *Pong*, and Ralph Baer conceived the Odyssey videogame console, academicians perfected coding skills by writing science fiction games. *Space War*, developed at M.I.T., is generally credited as the first significant computer entertainment program.

The first batch of computerized outer space epics stressed action, though several designers attempted to balance the flying and shooting with a modicum of strategy. The more cerebral titles, often loosely patterned on the "Star Trek" universe, required the player to monitor enemy activity in a number of sectors of space.

As the captain of the only spacecraft capable of stopping the hostile aliens, the gamer warps from sector to sector in response to pending attacks. Once the super-ship reaches a sector, joystick movement and frequent resort to the fire button can eliminate the threat.

It took awhile for computer science fiction games to venture beyond space battles. Many designers were afraid to tackle science fiction, because they felt the hardware couldn't do justice to the sweep and scope that goes with star-spanning adventure.

The introduction of 6502-based computers like the Commodore 64 opened the gate for sophisticated science fiction strategy games and adventures. Action contests (see August's *Ahoy!)* are still popular, but publishers have created a whole library of mind-teasing futuristic funware.

The contrast between *Star Trek: The Promethean Prophecy* (Simon & Schuster) and the previously described "Trek" action games shows how science fiction software has matured in the last decade.

This is the second text adventure starring Captain James T. Kirk and the crew of the starship Enterprise. The two games, designed by different creative teams, couldn't be less similar. In *Star Trek: The Kobayashi Alternative,* Micro Mosaic went "where no programming has gone before" with its radically new adventure format. It emphasizes character interaction in pop-up windows, lots of planet-hopping, and accurate depiction of well-known "Star Trek" figures like McCoy, Spock, and Scott.

The essentials of the system used by Trans-Fiction for *Star Trek: The Promethean Prophecy* should be familiar to anyone who has ever played an Infocom adventure. Although the vocabulary is skimpier, and the screen presentation is better organized than in most Infocom titles, the style of play is identical. The gamer types in commands and reads the program's text output on the screen.

The game-system shapes Trans-Fiction's approach to "Star Trek." *Promethean Prophecy* stresses a tightly constructed plot, a highly detailed alien society, and more puzzlelike situations than the previous adventure.

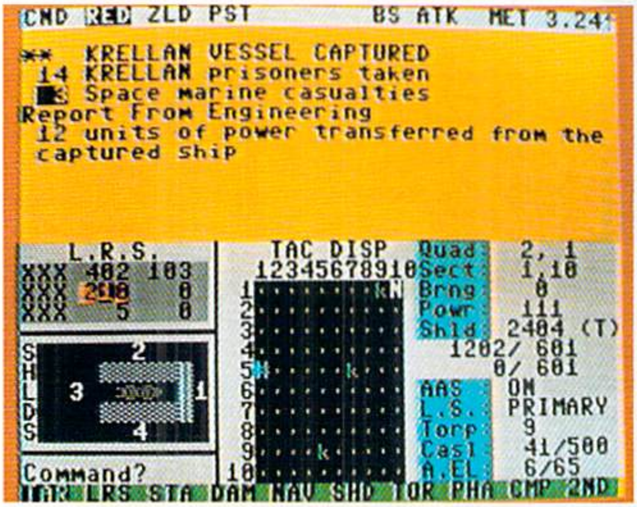
Trekkies and Trekkers in the audience will be pleased to know that the plot is perfectly in the spirit of the television series and movies. A brief space battle at the start of the game leaves the Enterprise with a contaminated food supply. Unfortunately, the Federation craft is so far from the hub of interstellar activity that the crew could starve to death by the time the Enterprise docks at a friendly port.

Spock reports that a nearby planet, Prometheus Four, may offer the only hope. The gamer, as Capt. Kirk, leads a small landing party down to the surface of the planet.

Once there, the ultimate goal is to secure a source of food for the Enterprise so the ship can continue its mission of exploration and discovery. Without violating the prime directive against interfering with alien cultures, the computerist must observe the many facets of the highly stratified Promethean society. Learning its secrets allows Kirk and friends to unravel the mystery of the Promethean prophecy and acquire the needed food.

The writing is pretty good, and TransFiction obviously tried hard to capture the right tone. Each of the characters talks in his or her familiar manner, and there are a couple of new faces on the bridge to enliven the proceedings.

The narrative portions of the game don't quite measure up to the dialogue. Even for a space epic like "Star Trek," some of the prose is too flowery and exaggerated.



```
CMD RED ZLD PST            BS ATK  MET 3.24

**  KRELLAN VESSEL CAPTURED
 14 KRELLAN prisoners taken
  3 Space marine casualties
Report From Engineering
 12 units of power transferred from the
 captured ship

    L.R.S.           TAC DISP   Quad   2, 1
XXX 402 103      12345678910Sect   1,10
XXX 210   0     1          kN Brng    0
XXX   5   0     2             Powr  111
                3             Shld 2404 (T)
S      2        4                 1202/ 601
H               5N       k           0/ 601
L  3         1  6             AAS   ON
D               7             L.S.  PRIMARY
S      4        8             Torp  9
                9     k       Casl  41/500
Command?       10             A.EL  6/65
INT LRS STA DAM NAV SHD TOR PHA CMP 2ND
```

Star Fleet 1 *offers an impressive degree of detail, affording the gamer control over weapons, sensors, navigation, shields, and other aspects of a futuristic ship.* *READER SERVICE NO. 216*

There's also a tendency to put too many thoughts into the player's head. The program constantly tells Kirk what he thinks and feels, instead of just presenting data and allowing "Kirk" to draw conclusions. This is, admittedly, a common flaw of adventures in which the player assumes the role of a specific character with well-defined traits. It's annoying at times, but it shouldn't prevent enjoyment of the program.

The most serious criticism of *Star Trek: The Promethean Prophecy* is that it isn't very exciting. There's too much walking and watching, and not enough things to do. This passivity is implicit in the nature of the story, but some more exciting subplots could have picked up the pace a bit.

Space War — Deluxe!

Star Fleet 1 (Interstel) is nothing less than the ultimate elaboration of the primitive "Trek" programs described previously. Trevor C. Sorensen, aided by the three brothers Keeton and Dan Shelton, has turned the old flying and shooting format into a genuine simulation of interstellar combat.

The computerist zips around an assigned region in space in one of several ships of the United Galactic Alliance. A rookie pilot fresh from the Academy gets command of the training vessel Republic, but successfully completing missions earns promotion and the helm of an Invincible Class starship.

Each region is divided into an eight by eight grid of quadrants. The ship moves from quadrant to quadrant in response to threats from the evil Krell and Zaldron empires against friendly star bases in the area.

The wealth of detail is impressive and fascinating. The armchair space ace controls weapons, shields, sensors, navigation, and just about every other aspect of a futuristic fighting ship.

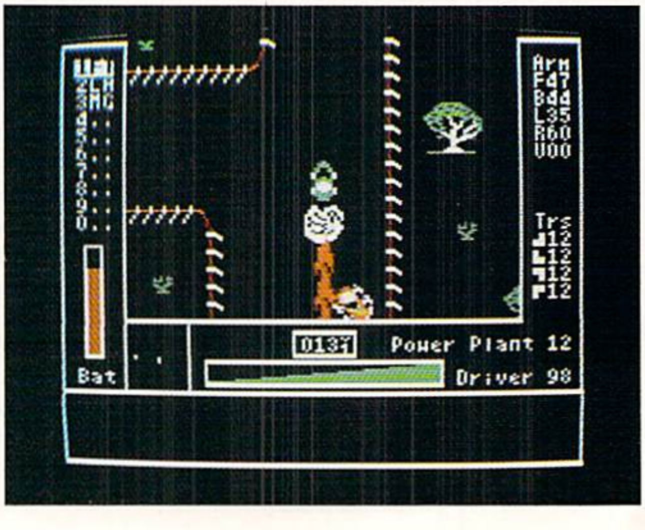
Besides violent clashes with Krellan and Zaldron ships, the player must contend with such things as damage to vital ship functions, regular maintainance, navigational errors, and infiltration by alien commandos. It is even possible to capture defeated enemy craft with the tractor beam and take prisoners and supplies.

The two enemy races are quite interesting. The Krellans are warm-blooded humanoids. Their caste society positions the military as the only avenue out of a life of backbreaking and unrewarding labor.

The Zeldrons, by contrast, are intelligent reptiles who dwell beneath the surface of their worlds. Less aggressive by nature than the Krellans, the Zaldrons are masters of battle strategy. The imperialistic ambition of this matriarchal society's Queen has prompted the Zaldrons to ally with the Krellans. Like the Romulans in "Star Trek," the Zaldron ships have the ability to cloak their location with an invisibility shield.

The graphics are light-years behind the actual simulation. Ships are identified by single letters on the tactical display, and text fills most of the crowded main display screen. A few sound effects emphasize crucial aspects of the game, including combat, but *Star Fleet 1* is more of a treat for the mind than the senses.

Each player starts the solitaire campaign as a recently graduated cadet. A new player establishes a service record to which all subsequent successes and failures are added at the end of each play-session. A Star Fleet officer advances rank by rank toward Admiral as he or she compiles a suitably impressive record. Although only one person can actually play at a time, several participants can maintain service records and compete to see who can



Devoid of aliens, intergalactic travel, and other space opera staples, **Auto Duel** *centers around the menace of highway gangs in the not too distant future of North America.* *READER SERVICE NO. 217*

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rise to the top of the pyramid the fastest. In general, a player must complete five missions at his or her current level of skill with at least a 75% efficiency rating to move up to the next highest rank.

The program bestows special awards as well as promotions to salute achievement. There are 23 possible decorations, which range from the Star Fleet Citation for Gallantry (at level 1) to the seldom-awarded Exceptional Service Medal.

The documentation deserves an award, too. It is complete, unambiguous, and very well organized. The two booklets and quick reference card included with the disk are further buttressed by a lengthy demo provided on the game disk.

Star Fleet 1, even without super sound and graphics, is a landmark in science fiction strategy games for the computer. It belongs in the software collection of every computer-owning science fiction fan.

Drive Offensively!

Auto Duel (Origin Software) represents a different brand of science fiction than *Star Trek: The Promethean Prophecy* or *Star Fleet 1.* Intergalactic travel, bizarre aliens, and other space opera trappings are absent. Based on Steve Jackson's tremendously popular tabletop game, *Auto Duel* concerns a near-future era right here in North America.

The premise is that a succession of natural and man-made calamities has fractionalized the United States. The menace of highway outlaw gangs, which jumped into the power vacuum left by waning Federal authority, inspires the development of armed and armored vehicles.

The gamer starts as an apprentice driver of modest skills in the Northeast U.S. A driver must acquire enough money to build and outfit a vehicle. Though the casino at Atlantic City provides a shortcut to wealth, the best way to get a stake is to sign up for a novice tourney at one of the arenas found in the region's towns. The arena provides free go-karts armed with machine guns for rookies.

Winning a few arena battles against a field of computer-directed rivals earns enough dough to visit the assembly plant. Depending on the health of the buyer's purse, vehicles of all sizes, equipped with a dazzling variety of weapons, can be built.

Gameplay is divided into two segments. The gamer moves the onscreen driver around a town with the joystick. Entering a building brings up a menu of possible activities. This phase of the game simulates the driver's life when not behind the wheel. Characters, which can be saved to the game disk, do such things as maintain their vehicles, eat, sleep, unearth rumors at local bars, hire out as couriers, and battle in the arena.

Programs Covered in this Article

AUTO DUEL ($49.95)
Origin Systems Inc., 340 Harvey Road, Manchester, NH 03103 (phone: 603-644-3360).

PORTAL ($39.95)
Activision, 2350 Bayshore Frontage Parkway, Mountain View, CA 94043 (phone: 415-960-0410).

STAR FLEET I ($39.95)
Interstel Corporation, 18096 Kings Row, Suite A, Houston, TX 77058 (phone: 713-333-3909).

STAR TREK: THE PROMETHEAN PROPHECY ($32.95)
Simon & Schuster, Gulf + Western Building, One Gulf + Western Plaza, New York, NY 10023 (phone: 212-333-3397).

The combat portion of *Auto Duel* is a joystick-activated action-strategy contest. The driver steers with the stick and uses a combination of action button and stick movement to access any of the car's weapons.

This format gives the program a distinctive pace. The real-time intensity of vehicular combat punctuates periods of leisurely preparation.

Auto Duel's weaknesss is its devotion to the Protestant Ethic theory of role playing gaming. This approach requires the player-surrogate to start from the bottom and acquire power, wealth, and skill through experience. Although this is certainly realistic, it may not give a quick enough payoff to satisfy some computerists. It takes a lot of hard play to get a character into a position to buy and use the most intriguing cars and equipment, and not everyone will have the patience for the slow climb.

Those who are willing to brave the dangerous road to success will be rewarded with many hours of first class entertainment. The computer edition of *Auto Duel* has a little more action and less strategy than the tabletop version, but it has more than enough to both satisfy the discriminating science fiction gamer.

The Computer SF Novel

The most interesting science fiction program published in the last year is not, properly speaking, a game at all. *Portal* (Activision) is the first creation worthy of the name "Computer Novel." It tells a complete story in a way which would be impossible without the help of the computer.

Several companies have dubbed their products computer novels or electronic novels in the past. All pale by comparison to Rob Swigart's tale of a future society in which the entire population suddenly disappears.

Too often "computer novel" is a code phrase for "unitary, linear plot." The designer, lacking the ability to write a multipathed, interactive adventure, constructs a storyline which the protagonist must follow from start to finish in a set order. At their worst, these programs degenerate into a series of forced moves. Each of the computerist's commands triggers a couple of screens of text which propel events to the next forced move.

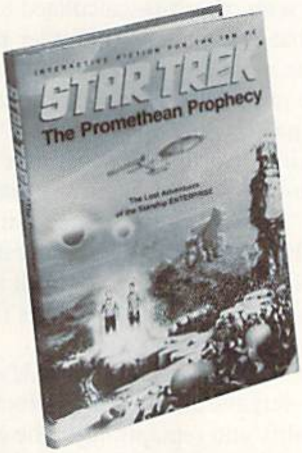
Portal is fundamentally a database. The computerist reads files as the program adds them to the menus of the 12 data storage areas. *Portal* is a novel, rather than an adventure, because the user does not interact with the plot or characters. The computerist finds files, studies their content (which includes text, maps, charts, and graphs), and gradually pieces together the entire novel.

In *Portal*, the user is a space explorer, assumed lost, who returns to a depopulated Earth. The people have vanished, and all that's left is the slowly "dying" world computer network.

The main display is a map of the 12 data spaces in the system. Each holds a specialized type of knowledge. Waswatch, for instance, is a computerized geneology. A file in this area provides three graphs for every character in the story: Core Intelligence, Physiology and ESP, and Family Tree.

The computerist moves among the dataspace with the joystick. Pressing the action button allows the user to splice into the data space currently shown on the screen. Once inside a data space, an icon-based menu makes it simple to study the various active files.

Homer, the Storytelling Artificial Intelligence, is the most interesting of the data spaces. It is an artificial intelligence which organizes the data supplied by the various files into a coherent narrative. While Homer sometimes drags out scenes a little, its periodic extensions of the story are the focal point of reader interest.



The text adventure continues—sort of.
READER SERVICE NO. 218

The graphics are mostly simple geometric shapes, but there's just enough happening on the screen to keep the waits during disk access from fraying nerves and disrupting concentration. The artful use of sound and pop-up windows in combination makes these delays all but unnoticeable.

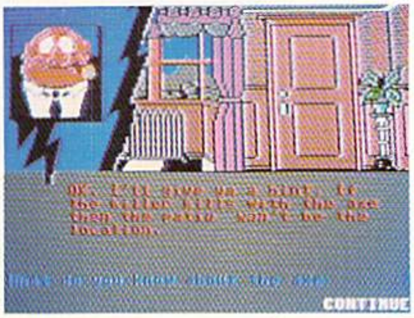
Portal is obviously the first of many such computer novels. As such, it is a brilliant beginning. Now only time will tell if it is a one-shot wonder or the foundation of a new form of computer entertainment.

Next month, *Ahoy!* will look at some of the more action-oriented science fiction games which have made their debut in the last year. Meanwhile, these SF strategy contests will challenge computerists' mental abilities to the utmost. ☐

KILLED UNTIL DEAD

Accolade
Commodore 64/128
Disk; $29.95

Hercule Holmes, the world's greatest detective and relative of a certain British super sleuth, is an overnight guest at the Gargoyle Hotel. There's crime in the air, though the dastardly deed isn't yet done. The player, as Holmes, must prevent the misdeed from happening at midnight. If the pure joy of sleuthing isn't enough incentive, then think of this: if the player fails, the victim could be Holmes!



Killed Until Dead: *and then tortured?*
READER SERVICE NO. 219

Several tools are available to help Hercule's investigation. Files on each of the five suspects are filled with both helpful and useless data. Surveillance can be ordered, to monitor activity in the rooms, break into a room, or to tape a set amount of time off the monitor. It's best to monitor a room to make sure it's empty before trying to break in

Don't look for a hairpin in order to gain entrance into a room; instead, a good knowledge of famous murder books, films, and television shows is required. A correct answer to trivia questions results in immediate access to vital information in the room. A wrong answer summons a security guard to thwart the player's attempt.

Once the player gathers specific information on the suspects, it's easier to get even more clues by questioning the five by phone. Ask the right questions and see the suspects sweat. Ask the wrong ones and get taken right down the primrose path.

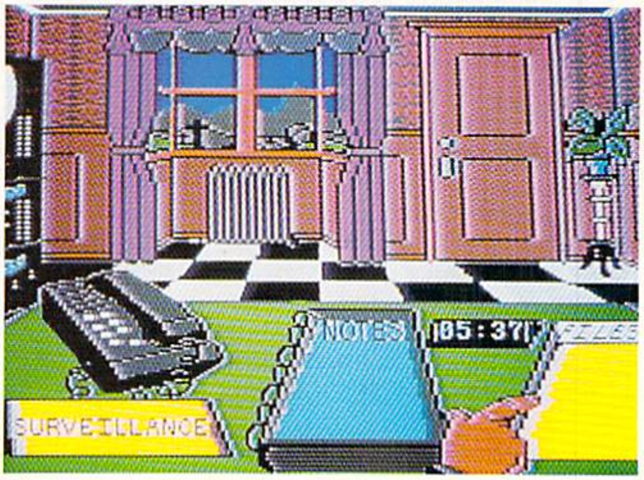
Unlike some murder mysteries, *Killed Until Dead* doesn't require the player to take reams of notes. All the pertinent information uncovered is in a space marked "Notes" on the desk.

In fact, thanks to the modern technological conveniences, Hercule doesn't have to leave his desk at all. On the desktop, right at the detective's fingertips, are the files, telephone, and surveillance equipment. The joystick moves a finger on the screen to point out the player's choice of activities, and the button makes the selection. Even the telephone boasts the latest wrinkle in modern technology: Hercule sees the reactions of the people called as he asks his questions.

Once Hercule has sleuthed out all the necessary information, he can accuse the suspected plotter. To win the game, he'll need the victim, the location, and the device, plus the motive for the crime.

There is one catch. There are only 12 hours left to stop the felony. Unfortunately, the moments don't click away in real time. Actually, those hours pass in about 25 minutes, so there's no time for dawdling.

The cases, and there are more than 20, are divided into four difficulty levels. In a whimsical bit of humor that pervades the entire proceedings, the



State of the art super sleuth Hercule Holmes need never leave his desk, with files, picturephone, and surveillance equipment at his fingertips. Information uncovered is stored in "notes" file.

levels are titled Elementary My Dear, Murder Medium Rare, Cases For The Cunning, and Super Sleuth.

The set of cases will take some time to figure out. In fact, that's one of the program's few flaws. The stringent time limit almost certainly dooms the computerist's first few cases to failure, even at the easiest levels, while he learns to manipulate the game's elements.

The second shortcoming of *Killed Until Dead* is occasional vagueness in the documentation. The rulebook says to read all the files, but it doesn't say when. Some gamers will, erroneously, take time to read them all first, and cause Hercule to miss an opportunity to tape some of the secret meetings at the hotel. It would be better to read them as each becomes necessary, since the files are always available.

Killed Until Dead is thought-provoking, but not too serious. Although it's challenging, it doesn't require a college degree in deductive reasoning. The player, as Holmes, communicates with the suspects by using the joystick to select questions from a list of multiple choices, similar to an earlier release from Accolade, *Law Of The West.*

Attractive graphics and a smooth play-mechanic make the game enjoyable as well as brain-stretching. *Killed Until Dead* is undoubtedly one of this year's best entertainment titles.

Accolade, 20813 Stevens Creek Blvd., Cupertino, CA 95014 (phone: 408-446-5757). *—Rick Teverbaugh*

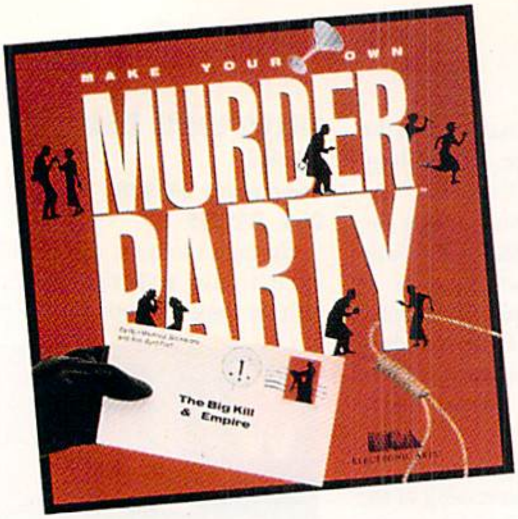
MURDER PARTY

Electronic Arts
Commodore 64/128
Disk; $39.95

The "Murder Party" is the latest expression of a type of entertainment which has flourished since Victorian times. It mixes pleasant socializing, amateur theatrics, and the excitement of a criminal investigation to provide an evening of entertainment for a group of six to eight people.

The Trans Fiction design team, also responsible for *Star Trek: The Promethean Prophecy* (see article on page 43), has produced a program for creating numerous variations on two different mystery stories, "The Big Kill" and "Empire."

The computer is not used during the murder party itself. The machine sets the fun in motion, but it is not needed to monitor, referee, or otherwise control the proceedings once things get rolling.



The computer's only role in your **Murder Party** *is to set the evening's fun in motion. About 100 pages of text must be printed for an eight-player game. READER SERVICE NO. 214*

The disk contains everything needed to put together an evening. This includes a questionnaire which enables the program to adjust the details concerning the characters to fit the actual attendees, invitations, envelopes, and clue packets for each character.

The material is quite voluminous. It takes nearly two hours for a printer of average speed to pump out the 100 pages of text which suffice for an eight-player game.

The routine of play in *Murder Party* is pretty much the same as for non-electronic games of this sort. Each player receives a description of the case, some personal information about the character which he or she will portray, and a set of clues.

Each character is a suspect, often with a hidden motive for committing the crime under scrutiny. A game consists of four turns. During each round, every guest has pertinent data which must be revealed to the other participants, plus other facts which are only disclosed if the other characters push hard.

The players are simultaneously the detectives and the objects of other players' suspicions. Innocent characters must tell the truth at all times, but everyone is encouraged to embroider the basic information with non-conflicting elaborations.

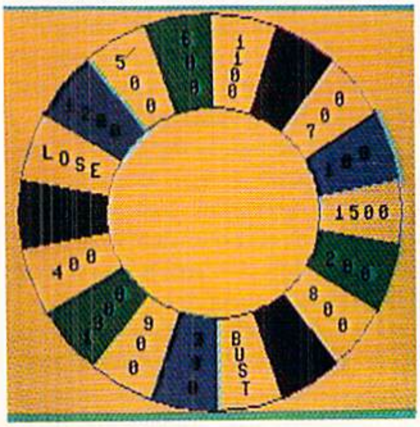
Spirited role-playing leads to intense personal involvement. After a turn or two, the guests will be thinking and feeling exactly like the characters they are portraying in the game.

Some party hosts like to take the theatrics even further. They decorate their homes in line with the theme of the scenario, cook an appropriate dinner for the players, and even encourage guests to dress in period costumes. The documentation contains excellent suggestions for adding these frills, along with other tips calculated to assure that even one's first murder party will be a ringing success.

The two games included on *Murder Party* present a pleasing contrast. "The Big Kill" involves the death of a hippie-turned-film star, Jeremy Sumners, while "Empire" concerns the killing of Rose Hips, boss of a big corporation. Electronic Arts is expected to sell additional disks with new scenarios if the initial title proves popular.

Use of the computer helps *Murder Party* surpass all similar products in flexibility and replayability. The computer picks a new murderer each time the user sets up a party, so a scenario can be played more than once. This is a happy change from other mystery packages, which can only be played once and then must be tossed away.

The program can also deal with such



Hangman Roulette: *poor execution. READER SERVICE NO. 215* situations as a last-minute no-show or a guest list with an unequal number of men and women. Both are customarily fatal to a mystery party, but they amount to little more than momentary inconvenience with this fine Electronic Arts disk.

Electronic Arts, 1820 Gateway Dr., San Mateo, CA 94404 (phone: 415-571-7171). *–Will Richardson*

HANGMAN ROULETTE

Low Spark
Commodore 64/128
Disk; $21.95

No entertainment disk of the last six months better illustrates the sweeping changes which are reshaping the software field than this first effort from an eager new publisher. Great packaging, cogent documentation, and a lively premise cannot disguise the fact that *Hangman Roulette* only partially fulfills reasonable consumer expectations for copyrighted software.

The play-mechanic, borrowed from the popular television game show "Wheel of Fortune," will fascinate fans of word puzzles. A game consists of four rounds of puzzles, each of which is a word or phrase which must be identified.

A spin of the "wheel" starts each player's turn. The gameboard has a blank square for each letter in the puzzle. If the pointer stops at a dollar amount, the player tries to guess a consonant. The turn is over if the letter isn't in the mystery word or phrase. If the puzzle does include the letter, the appropriate blank squares flip over, the amount is credited to the player's running total, and the same person tries the wheel again.

Other results are possible on the wheel. The participant can get a free turn, automatically lose a chance to pick a letter, or lose all the money accumulated during the game.

A player may also buy a vowel for $250 at the end of any turn. If the vowel isn't included in the puzzle, it ends the turn.

A round ends when someone solves the puzzle. The contestant who has the biggest pile of cash at the end of four rounds is the winner of the game.

Hangman Roulette includes 500 puzzles. Categories are fictional character(s), person, place, thing(s), and phrase. Phrases include song lyrics, quotes, sayings, proverbs, and the like. Low Spark should consider marketing additional disks with new supplies of puzzles to extend the play-life of the game.

We admire the energy and sometimes even the ability of programming hobbyists. Their inventiveness and diligence is an inspiration. Unfortunately, today's entertainment software is so sophisticated that few "just for fun" programmers can even come close to the overall quality standard of professionally designed funware.

The most frequent drawback of public domain software is that amateur programmers generally excel at one, or at most a couple, of the aspects of creating a complete game. This limited expertise may be enough to create a game other computerists will accept at no charge, but the overall excellence which characterizes the newest commercially published titles is elusive.

The author of a public domain game often expends many hours trying to finesse past gaps in knowledge, talent, and ability. This is laudable effort, but it is no substitute for bringing in an expert specialist to draw the illustrations, write a theme song, design the title screens, and perfect anything else that isn't quite up to current state of the art.

Hangman Roulette is a perfect example of the gap between a piece of software created by talented amateurs and one produced by a professional design team. It has many good points, but the execution is both uneven and crude.

If only the entire production were as sound as the basic play-mechanic! In the C-64 mode, the "wheel" is a vaguely circular arrangement of the possible results. A dot moves around the circle and stops at the result. The main display is a little fancier in C-128 mode, but not much. The wheel looks like a wheel, but only the dot moves.

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Hangman Roulette would be more involving if players actually saw an ornate spinning wheel, an animated gameboard, and other trimmings. The best idea of all would have been to license "Wheel of Fortune" and have a digitized Vanna White flip the letters.

Almost any audiovisual enhancement would have done much to improve *Hangman Roulette*. As it is, this is a bare-bones program based on a concept dear to the hearts of word-puzzlers.

Low Spark, 5704 Webster, Downers Grove, IL 60516 (phone: 312-963-0668). *–Arnie Katz & Joyce Worley*

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C-64 TO AMIGA FILE TRANSFER

By Morton Kevelson

During the course of microcomputing activity there will come a time when it will be necessary or desirable to transfer a file from one machine to another. In an ideal world this would not present a problem. The simplest solution would be to save the file on disk with the first machine and carry the disk to the second machine. In the real world things are not so simple. The approach described will only work between functionally identical machines which run the same operating system and use the same disk format.

As Commodore users we have had our fair share of unique disk formats. However, until recently we could count on across the board disk compatibility among all Commodore computers. Not any more! The newest generation of Commodore's machines, specifically the Amiga, uses a disk size and format unlike anything used by any other Commodore computer. The 1571 disk drive has the ability to read and write a variety of MFM formatted disks as well as Commodore's proprietary GCR format. The final nail in the uniform format coffin is Commodore's adoption of the IBM disk format with the introduction of the PC-10 and the Amiga 2000.

We recently developed an urge to transfer some C-64 disk files to our Amiga. This was partly due to a desire to convert some of our *Art Gallery* images to Amiga IFF files for use in *Deluxe Paint*. We already had some public domain utilities which would translate *DOODLE!*, *Koala*, and *Print Shop* files to IFF format, so all that remained was to get the files onto an Amiga disk.

We had also noticed the growing library of Amiga material to be found on QuantumLink. This Commodore-dedicated online service may be accessed only with its own custom software, which runs only on the C-64. Thus, while it is possible to download the Amiga files to 1541 format disks, the files will still have to be transferred to the Amiga.

The traditional methods of transferring files between dissimilar machines involve telecommunications. The most prevalent approach is via the telephone lines and requires a modem at each machine with supporting telecommunications software. If the machines are within hailing distance of each other, the telephone company tariffs may be avoided. A direct wire between the two modems will serve as a suitable link. A null modem cable may also be employed to connect serial port directly to serial port, entirely eliminating the need for modems.

Instead of telecommunicating, we chose to make maximum use of available system resources, both hardware and software. The procedure involved the use of the IBM MS-DOS disk format as a common mode disk format between the two machines. This did involve an imposing collection of hardware and software, which we nonetheless felt was likely to be available to many of our readers. Here is a shopping list:

1 Commodore 128
1 1571 disk drive
1 Amiga
1 Amiga 1020 5¼" disk drive
1 Copy of *Big Blue Reader* (C-128), S.O.G.W.A.P. Software (see review on page 64 of this issue)
1 Copy of *DOS-2-DOS* (Amiga), Central Coast Software (see review on page 55 of this issue)
Some blank 5¼" and 3½" disks

The procedure we followed was conceptually convoluted, surprisingly simple to implement, and rather swift in its execution. Here it is:

Step 1: Format a 5¼" disk in MS- DOS format. This may be done on the 1571 with *Big Blue Reader* or on the Amiga under the *Transformer*, or on any conveniently situated IBM PC or PC Clone.

Step 3: Copy the files from the MS- DOS format disk to an Amiga format disk using *DOS-2-DOS*, the Amiga, and the 1020 disk drive.

We expect that most applications for computer to computer data transfers that will be quite mundane. Users will find endless opportunities for exchanging text files, spreadsheet files, and database lists. Many popular productivity programs are currently available for use on more than one brand of computer. Very often these programs use identical file formats for all the machines on which the program runs. Transferring these files to the proper disk is all that is required to use them.

In general, programs written for one brand of machine will not run on another. The exceptions to this rule are programs which are written in a high level language and saved as a text file. High level languages on most computers have the ability to read and write program files as ASCII text files as well as in binary object code. These programs can then be transferred with little or no modification between machines. Note that the C-64 does not normally save or load BASIC programs as text files. Here is a simple method for saving a program file to disk as a sequential text file in PETSCII. This will work with the VIC 20, C-64, Plus/4, and C-128:

```
OPEN 8,8,8,"FILENAME,S,W":CMD 8:LIST

PRINT#8:CLOSE 8
```

If you have a file number greater than 128, a linefeed (CHR$(10)) will be added to each carriage return (CHR$ (13)). Some systems require the additional linefeeds. ☐

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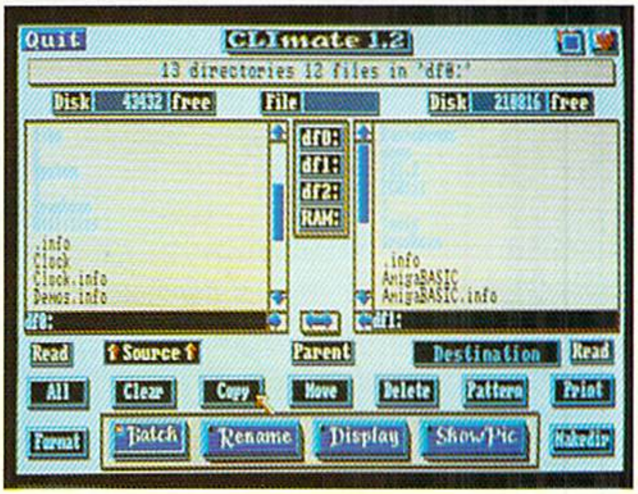
Specifically, all users of a disk-based microcomputer (and how many micros do we know of that aren't disk-based?) will have a need to copy, rename, move, examine, print out, ponder, and otherwise reorganize the contents of their disk libraries. The Amiga is no exception to this rule. In fact, the disk-based nature of the Amiga's operating system makes proper maintenance of its disk files essential to its performance and the user's sanity.

The Amiga, by virtue of Intuition and its icon-driven Workbench, provides a utopian environment whereby the user can manage the disk library. All the necessary tools are readily available at the point of a mouse and the click of a button. However, Amiga disk files can be manipulated by the Workbench if and only if each file has an accompanying icon. These icon files can be readily recognized in a directory listing by the ".info" suffix on their files names. Among other things, these ".info" files contain the graphics data which makes up the icon which appears on the Workbench screen. Without this icon, the mouse pointer has nothing to grab hold of.

Unfortunately, this lack of icon images is not a rare occurrence in the Amiga environment. There is much "serious" software which disdains the use of these convenient symbols. The Amiga's alternate operating environment is the Command Line Interface (CLI). Under the auspices of the CLI, every eventuality has been anticipated. This keyboard-driven command center is a very powerful and complete control environment for a microcomputer. Mention of the CLI has also been known to make the stoutest souls cringe in anticipation. For along with all that power, the CLI is almost totally lacking in user amenities for entering and correcting commands. This places an onerous burden on the user, particularly in view of the multilevel hierarchy which can be achieved by the AmigaDOS directory structure.

PHOTOS: MORTON KEVELSON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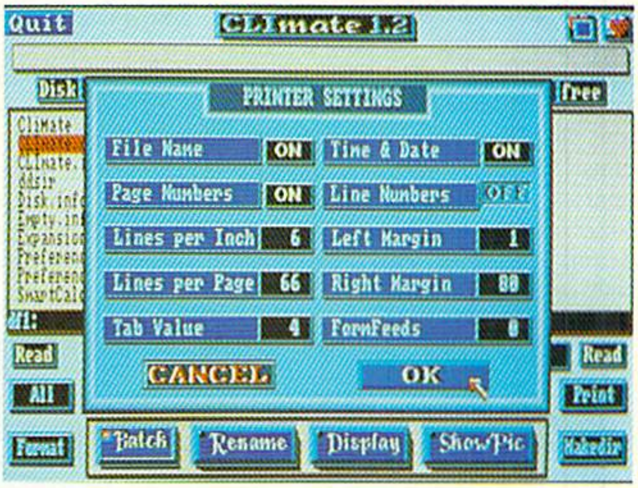
.info
AmigaBASIC
AmigaBASIC.info
df0:
df1:
Read
Source
Parent
Destination
Read
All
Clear
Copy
Move
Delete
Pattern
Print
Format
Batch
Rename
Display
ShowPic
Makedir

All of CLImate's *primary disk maintenance functions are visible on the main screen in batch mode. Operations are supplemented by additional prompt screens equipped with string gadgets.*


Quit
CLImate 1.2
Disk
free
PRINTER SETTINGS
CANCEL
OK
Read
All
Format
Batch
Rename
Display
ShowPic
Read
Print
Makedir

File Name ON
Time & Date ON
Page Numbers ON
Line Numbers OFF
Lines per Inch 6
Left Margin 1
Lines per Page 66
Right Margin 80
Tab Value 4
FormFeeds 0

Printer control requestor for use with the program's Print option. Several documentary functions are offered in addition to the usual lineup of printer settings. READER SERVICE NO. 222

With this background in mind we recognize the need for a utility such as *CLImate*. *CLImate* combines the ease and convenience of the Workbench with the direct power of the CLI. All the essential tools for efficient file maintenance are placed at your fingertips. In fact, we found *CLImate* such a pleasure to use that on our first evening with it we took care of some much-needed file manipulation we had already put off for too many weeks.

Reviewed This Month:

CLImate 53
DOS-2-DOS 55
Defender of the Crown 57

CLImate may be accessed directly from the CLI or by clicking on its imaginative icons. It runs on a screen of its own and it may be readily brought to foreground or background via the front to back gadgets or with the left-Amiga/M/N keystroke sequence. It does use up 100 kilobytes of RAM, which means you will not be likely to keep it in the machine when you don't need it. Since we have our Amiga fit-

CLImate
CLImate 1.2
CLImate
CLImate
CLImate 1.2
CLImate

CLImate's *disk and program icons before (left) and after selection—our vote for Whimsical Icons of the Month.*

ted with aMega from C Ltd., we did not find memory limitations to be a problem. We tended to start up *CLImate* at the slightest excuse.

CLImate supports the Amiga's internal disk drive, up to three external drives, the RAM disk, and up to two hard drives. When *CLImate* is started up it will automatically determine your system's resources and display a "button" for each device on a central part of its screen. The main screen is partitioned so that the left side is always the source and the right side is always the destination. To select a drive simply click on the Source or Destination gadget followed by a click on the appropriate device button. The display screen is very well done; the buttons actually appear to recede slightly when pressed.

Once selected the directory is automatically read into the appropriate window. Files in the root directory show up in black with subdirectories in white. As the pointer is moved over the list the files are highlighted. Selection is done with the left mouse button while subdirectories are opened with the right mouse button.

All the primary disk maintenance functions are visible on the main screen in batch mode, as shown in the accompanying photograph. To copy files simply highlight them in the source window, select the destination device and directory, and click on the copy button. The move button will copy the files and delete them from the source. All operations are supplemented with

When Is a Bug Not a Bug?

When is a bug not a bug? When it's a feature, of course. That is just what we ran up against when we discovered that *CLImate* was not acknowledging the presence of all the files on one of our disks. We knew the files were there—they all showed up in the directory listing on the CLI—but try as we might, we could not get them to show up in the *CLImate* window.

The problem turned out to be an undocumented feature of *CLImate*. The first time *CLImate* accesses a disk it looks for the presence of a file called ".fastdir". If the file is not found and the disk is not write protected, *CLImate* will automatically create a ".fastdir" file on it. This file is simply a condensed listing of the disk directory. If you open one of the subdirectories on the disk, *CLImate* will create a ".fastdir" for it and place it in that directory. If ".fastdir" is found when the disk is accessed, *CLImate* automatically reads it in and uses its contents to create the directory display. The process is so fast that it is nearly instantaneous. Anyone who has ever waited for AmigaDOS to log in a disk and read its directory will certainly appreciate the value of this feature.

You can tell when *CLImate* is performing the task of creating the

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Reader Service No. 223

additional prompt screens which are equipped with string gadgets for all user-entered data. Movement through the directories is facilitated by the scroll gadgets. The horizontal arrows are useful for copying or exchanging the directory listings between the source and destination windows. This last feature comes in handy for moving files among different directories on the same disk.

The unused space remaining on the disk is shown by the Disk string gadgets right above the directory displays. The File string gadget above the center column shows the size of the file which is currently under the cursor. This information, which is continuously updated, is quite useful. About the only useful bits of information missing from the main display are the disk or volume name and the dates of the files. Some means of changing the disk name would have also come in handy.

Text files may be sent to the printer or displayed on the screen. The Print button brings up a secondary screen with a complete set of printer controls. In addition to the usual settings for margins, page length, and lines per inch, the printer screen offers several documentary functions. The printout can be set to include the filename, time, and date on each page. Pages and lines may also be numbered.

The onscreen display can be set for ASCII or hexadecimal. The hex display consists of 16 columns of byte values to the left with all printable ASCII characters on the right. The extreme left hand column carries a four digit hex number corresponding to the byte count of the first byte on each line. The screen display scrolls rapidly in only the forward direction. A pause button lets you halt the scrolling, but your reflexes will have to be very good to catch what you want. The screen can be stopped at the right place if you anticipate it and practice a bit. There is no provision for sending the hex display to the printer. Nor is there any provision for editing the contents of the files.

Since graphics is a popular application for the Amiga, *CLImate* provides some support in this direction. The Showpic button will display any IFF file as it is selected. This feature is a definite plus for setting up slide show disks and other such applications.

Without a doubt, the arrival of *CLImate* has improved the emotional climate in our computer room. The program provides a functional solution in an elegant setting to a sticky problem. *CLImate* is not copy-protected. The program files may be easily transferred to any disk that suits your fancy.

Progressive Peripherals & Software, Inc., 464 Kalamath St., Denver, CO (phone: 303-825-4144).

–Morton Kevelson

".fastdir" file by watching the top text gadget on the display screen. First the names of the files and directories, which are on the disk, will flash by. Then a brief message will appear indicating the creation of the ".fastdir" file. If the disk is write protected, a message to that effect will appear for an instant.

The first problem with this scheme is when you have added some files to the disk, without *CLImate*, after the ".fastdir" has been created. These files will of course not be included in the ".fastdir" file. The next time this disk is accessed by *CLImate* it will automatically read the ".fastdir" file and ignore any of the added files. The solution to this problem is to simply click on the Read button which is right beneath the directory window on the *CLImate* screen. This will force a read of the disk directory and an update of ".fastdir". The troublesome part is that none of this information is in the brief manual which accompanies *CLImate*.

The second problem occurs when the disk write protect has been enabled after some files have been added to the disk following the creation of the ".fastdir" file. When a write protected disk, which already bears a ".fastdir" file, is presented to *CLImate*, *CLImate* will only recognize the existence of the files that are recorded in the ".fastdir" file. Clicking on *CLImate's* Read button does not bring up the missing files. Note that this problem will not occur with disks that have always been write protected when presented to *CLImate*, as the ".fastdir" file cannot be created in the first place. Of course without a ".fastdir" you will have to wait for the entire directory to be read in whenever the disk is presented to *CLImate*.

As we found out, much to our chagrin, this particular bind was all too easy to get into. Most applications software create data files as required. Fortunately, it is simple enough to avoid this situation if you are aware of it by using the Read button with the disk write protect disabled. We have reported our perception of this problem to Dan Browning at Progressive Peripherals & Software, and we expect that something will have been done to alleviate it by the time you read this. The thing that bothered us the most about this entire series of events was that something was being written to our disks that we didn't know about. This could create a problem with copy protected software. Interestingly enough, *CLImate* will not display the presence of the ".fastdir" file in its own directory windows.

DOS-2-DOS

Central Coast Software
Amiga with two disk drives.
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You chose the Amiga because no other microcomputer in its price range can do the things it can do. Nevertheless, one cannot deny the dominance of the business market enjoyed by the IBM PC and its clones. In fact, Commodore has acknowledged the massive influence of Big Blue by offering several levels of hardware and software compatibility between the Amiga and the world of the PC. The first effort in this direction was the Transformer and the 1020 disk drive. This product, although somewhat limited, is a partial emulation of the PC done entirely in software. Next came the Sidecar, actually an entire PC clone which uses the Amiga 1000 as its terminal. The latest offering is of course the Amiga 2000, which straddles both sides of the fence.

Thus it comes as no surprise that many Amiga owners are also users of PCs in one form or another. The consequence of this activity is a need to transfer data between machines. This need is intensified by the availability of programs in versions for both the

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PC and the Amiga. These invariably employ similar data file formats for both machines. A data file created by such a program on the PC can be used by its counterpart on the Amiga. The data format of the more popular applications has also been adopted by other developers. The problem with transferring the data files from a PC to an Amiga and back again lies in the incompatibility of the respective disk formats. That is not the form of the data, but the structure of the magnetic domains which represent the data on the disk surface.

The traditional method of transferring data between incompatible computers is via a suitable telecommunications link (see the article on page 51 of this issue). If you own an Amiga with a 1020 disk drive and a copy of *DOS-2-DOS* you will be able to dispense with this tradition. This combination of hardware and software allows for the bilateral transfer of files from the 360K disk format used by the IBM PC and its clones to the 880K format used by the Amiga.

The success of this venture revolves around the ever-increasing trend in the microcomputing industry to standardize many of the components which make up a microcomputer. This is one of the side benefits of the pervasive influence of Big Blue and company. It turns out that the physical disk drives used by the Amiga are standard industry components. The most significant difference in disk drive hardware lies in the unique interface circuit employed by the Amiga. In the PC the disk drive must be uniquely identified to its controlling hardware. In the Amiga it is the order of connection which is important to the computer. The interface itself undertakes the task of acknowledging the computer query before passing the roll call on to the next drive on the chain.

In either case the DOS, which is loaded from the disk at power up, resides in the computer's RAM. It is actually the host computer's microprocessor which has the task of organizing the disk and maintaining the disk file structure. As a direct consequence, all that is required to change the disk format is to change the DOS or at the very least some specific routines within the DOS itself. This is exactly what *DOS-2-DOS* does with AmigaDOS. The first order of business performed by this 25K program is to query the user as to which drive will be the MS-DOS drive. It must be one of the Amiga's external drives (DFl, DF2, or DF3). The selected MS-DOS drive may be either a 3½" or a 5¼" unit.

Once you identify the MS-DOS drive, *DOS-2-DOS* disconnects the Amiga's disk drive routines from the selected unit and substitutes its own. At this point you are returned to the *DOS-2-DOS* version of the CLI environment. You will not be given the opportunity to forget this, as the CLI prompt is now changed to D2D>. As a point of information, we found that *DOS-2-DOS* would not initialize properly if we tried to start it using the Amiga's RUN command. However, we had no problems starting *DOS-2-DOS* from a second CLI window. The program performed properly under both version 1.1 and 1.2 of AmigaDOS.

If the MS-DOS drive selected by *DOS-2-DOS* is one of the Amiga's 3½" units, it will no longer be available as an AmigaDOS drive. You will only be able to access it through *DOS-2-DOS*. This step was necessary to avoid interference between MS-DOS and AmigaDOS. Under these conditions an AmigaDOS application trying to access the *DOS-2-DOS* drive will simply hang. Since there does not seem to be a reliable way to restart drive's task driver, it will be necessary to reboot the Workbench disk to regain access to it.

This problem does not exist if you are using the Amiga 1020 (5¼") disk drive as the MS-DOS drive. We were able to multitask *DOS-2-DOS* with other Amiga applications with the 1020 drive. Of course you should not try to access an MS-DOS disk under AmigaDOS and vice versa, as this will only confuse the operating system. You should also exercise caution to avoid accessing any disk while *DOS-2-DOS* is using it. The simplest way to achieve this goal is to limit multitasking activities while working with *DOS-2-DOS*.

DOS-2-DOS lacks any of the frills you may have become accustomed to from Amiga applications. In fact the *DOS-2-DOS* user interface is modeled after the command line familiar to MS-DOS users. For example, *DOS-2-DOS* directory listing will display the file names, the file size, and the file date. This format is used for both the MS-DOS drive and the AmigaDOS drives. Note that while *DOS-2-DOS* only supports a single MS-DOS drive at a time, it will support up to three AmigaDOS drives.

Several disk maintenance commands are available under the D2D> prompt. These are generally modeled after their MS-DOS counterparts. The most notable exception is the use of MS-DOS wild card characters for the MS-DOS disk, while retaining the AmigaDOS wild card characters for AmigaDOS disks. *DOS-2-DOS* also supports full directory paths on both the AmigaDOS and MS-DOS disks. The commands are summarized in the following table:

Table of *DOS-2-DOS* Commands

DIR	Display directory
CHDIR	Change current directory
TYPE	Display ASCII file
COPY	Copy files
DELETE	Delete a file
FORMAT	Format an MS-DOS disk
HELP or ?	Display command summary
EXIT or X	Exit to AmigaDOS

Most of these commands accept the directory or path names and file names as parameters. The use of the backslash (\) character with MS-DOS path names and the slash (/) for AmigaDOS directories is consistent with the respective parent DOS.

Two options are provided for use with the COPY command. Adding a −A to the COPY command line performs ASCII conversion from MS-DOS to AmigaDOS. This consists of the removal of all carriage return characters, control characters with an ASCII value less than 32 other than tab and linefeed, and the clearing of the high order bit if set. The −R option suppresses the replace file message if the destination file name already exists. If this option is not used, *DOS-2-DOS* will pause and ask you to verify the replacement of the destination file. This can be useful (and dangerous) when performing batch operations using the wild card characters.

The FORMAT command is only for MS-DOS disks. The supported options include single or double sided disks with eight or nine sectors per track and 512 bytes per sector. *DOS-2-DOS* only supports the 40 track MS-DOS disk format. Formatting of AmigaDOS disks must be done under AmigaDOS prior to entering *DOS-2-DOS*. MS-DOS disks formatted by *DOS-2-DOS* do not have a PC boot block.

Alternatives to *DOS-2-DOS?*

Although Commodore released the Amiga Transformer shortly after the Amiga's introduction, it took this year's release of version 1.2 of the operating system before any sort of AmigaDOS to MS-DOS transfer utility became available. If you have the version 1.2 upgrade, you will have found these utilities on the Extras disk included with the package. This program, which works through a mouse-driven interface, is intended to perform the same basic function as *DOS-2-DOS*. Does this mean that *DOS-2-DOS* has become obsolete?

From where we sit we can answer with a definitive no! We have tried the program on the Extras disk, more than once, and have yet to achieve a successful file transfer. Our attempts seem to abort with an error 1026, whatever that may signify. If any of you have had better luck with this utility please let us know.

Even if we assume that the fault is our own and the utilities do work, there are some other limitations to consider. The Extras utility will only use the 1020 disk drive as the MS-DOS drive. *DOS-2-DOS* will work with any external Amiga drive in either 3½" or 5¼" capacity. The Extras utility also requires the 1020 disk drive not to have been integrated into the system with the Mountdisk command. We found this to be a minor inconvenience and the probable cause for the inability to use the 3½" disk drive as the MS-DOS disk.

We expect that these problems will be overcome at some point. In fact we are puzzled that it has taken Commodore this long to get to work on the problem. With all the PC support Commodore has been working on, the need for such a set of utilities seems obvious.

It was apparently obvious enough to Central Coast Software, and we are fortunate to be the beneficiaries of their foresight. But then, a wide base of third party developers has always been the mark of a successful microcomputer.

Overall we were quite pleased with *DOS-2-DOS*. It did what it was supposed to do without any fuss or bother. Although a fancy mouse-driven windowing environment would have been desirable at times, we did not miss it for long. Besides, such an environment would probably exact a stiff penalty in program size. In its present incarnation *DOS-2-DOS* will run on an unexpanded 256K Amiga. This may not be a consideration for *DOS-2-DOS* users, as the Amiga Transformer requires a minimum of 512K.

Central Coast Software, 268 Bowie Drive, Los Osos, CA 93402 (phone: 805-528-4906). *—Morton Kevelson*

DEFENDER OF THE CROWN

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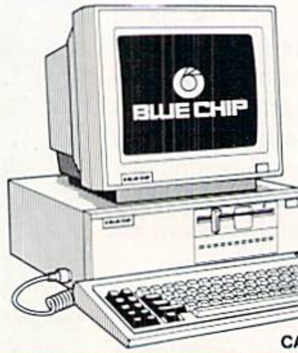

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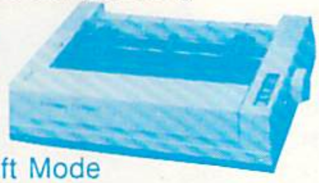

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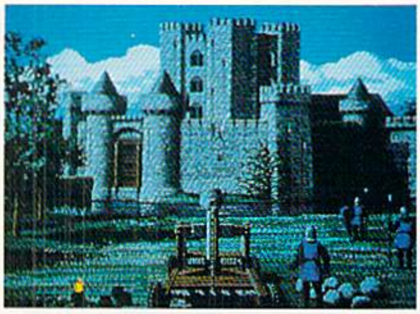
lights the world of the novel, but leaves a detailed plot simulation for some future adventure game.

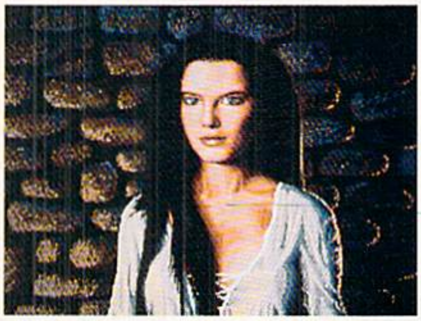
After the title and several brief introductory screens roll across the monitor to the strains of suitably martial music, an option page offers the solitaire player a choice of one of four characters. A beautiful vignette of each knight adds eye appeal to even this relatively minor aspect of the game. The computerist selects Wilfred of Ivanhoe, Cedric of Rotherwood, Geoffrey Longsword, or Wolfric the Wild by using the mouse to move the pointer to the appropriate quarter of the display and clicking the left button.

The competence of each Saxon noble is rated in three crucial areas: Leadership, Jousting, and Swordplay. These limitations aren't just cosmetic, so it may take a few rounds for the gamer to find the surrogate whose strengths dovetail most efficiently with his or her strategy.

First-timers may want to begin with

Defender of the Crown



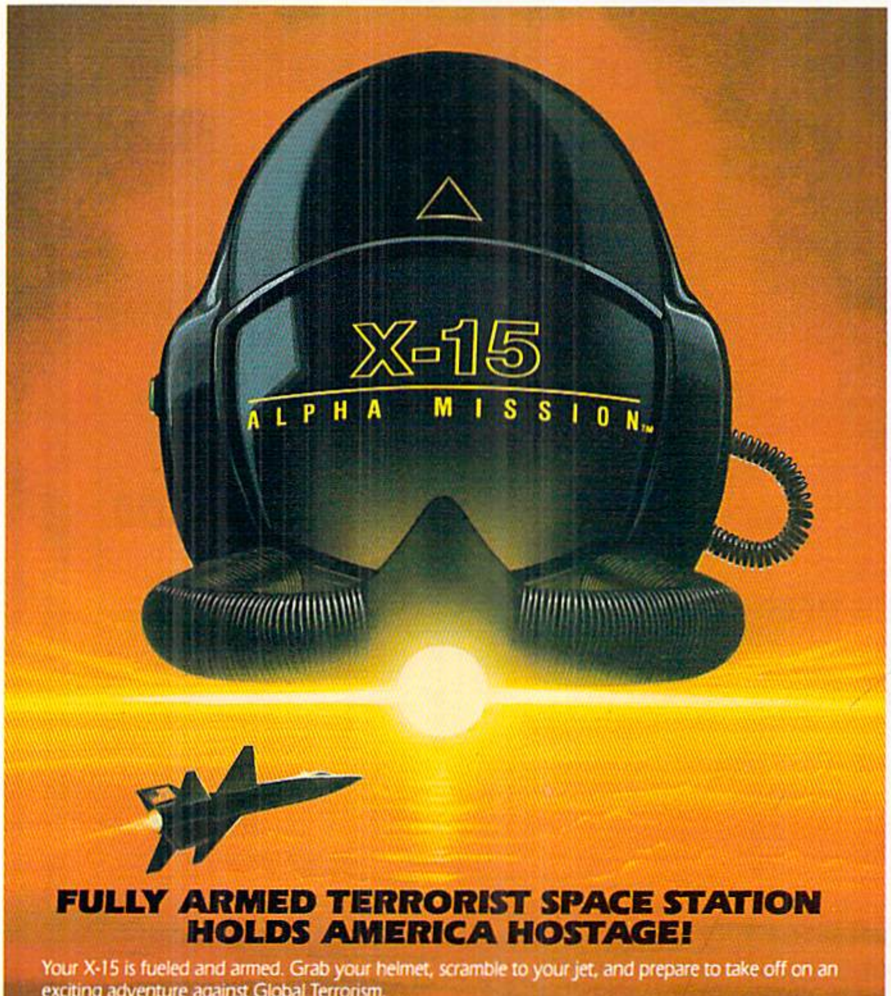


Every phase of **Defender of the Crown** *evidences loving attention to detail.*
READER SERVICE NO. 242

Geoffrey Longsword. His prowess with the blade comes in very handy during the "Raid" and "Rescue" action sequences.

Illustrated screens chronicle the player's journey to Sherwood Forest and outline the object of *Defender of the Crown.* Robin explains that someone has stolen the crown of England, and the Normans are mobilizing for battle. Robin exhorts the knight to reunite England by conquest, and he pledges the timely aid of his merry men. (Twice during the game, the knight may detour to Sherwood Forest and acquire some temporary reinforcements.)

A knight starts with a castle and a small army. The first portion of each turn takes place on a map of England sectioned into provinces. A mouse-se-



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ABSOLUTE ENTERTAINMENT™

Reader Service No. 236

lectable menu lists the activities possible in each turn. These are: hold tournament, seek conquest, go raiding, build army, and read map.

Picking "seek conquest" lets the gamer move his symbol, a small mounted knight, to any adjacent province. If it is undefended, the territory changes color to show that it has joined the knight's domain.

Mass battles are somewhat abstract. A pop-up window shows the composition of both armies and monitors casualties. The player can launch a ferocious attack, stand and fight, or run to avoid a rout.

Most conflict, however, is resolved through lushly illustrated arcade minigames. In the Joust, for instance, a knight can win or lose whole provinces in a single hit.

After one of composer Jim Cuomo's stirring calls to arms, and a bird's-eye view of the tilting ground, the program provides a first person perspective of a mounted knight thundering toward a foe armed with lance and shield. The computerist must hit a small area on the rival's shield to unhorse him. This is much harder than it sounds, since it's tough to aim accurately while being jounced and bounced by a charging warhorse.

Raid and Rescue thrust the player into sword-fighting sequences. The Saxon lord must battle across the courtyard and into the enemy castle to free the princess or capture the treasure.

A castle improves a province's defense. In a region with a fortress, the invader first plays a catapault arcade contest. If the player knocks down the fortress' wall with giant stones, the invaders get an advantage in the ensuing mass battle.

Every phase of *Defender of the Crown* evidences loving attention to detail. Music, artwork, and a smooth menu control system make this an easy game to learn and play. An excellent rulebook fills in vague points. It also has lots of fascinating data about the historical period, including a meaty bibliography.

It must be noted that *Defender of the Crown* is a fairly simple game which leans more heavily on arcade action than strategic thinking. Undoubtedly, Master Design Software's future titles will mix more sophisticated content with the truly breathtaking audiovisuals of this, its first, release.

For a couple of enjoyable evenings at the computer, no Amiga owner should overlook *Defender of the Crown.* It's the current King of Amiga entertainment.

Mindscape, 3444 Dundee Road, Northbrook, IL 60062 (phone: 312-480-7667). *–Arnie Katz*

SCUTTLEBUTT

Continued from page 12

each or $177 for the 10-disk lab pack:

Memory Building Blocks helps young children build memory skills through five concentration-type games.

Teddy & Iggy, usable with the regular C-64 keyboard or with the Muppet Learning Keys, lets children practice remembering sequences.

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Word Quest requires third to ninth graders to use their alphabetic and vocabulary knowledge to locate secret words.

Bank Street Beginner's Filer introduces students in the second through sixth grades to fundamental database concepts. Price is $79, or $237 for the lab pack.

Sunburst Communications, 914-769-5030 (see address list, page 12).

Gessler has revised its Battle of Words foreign language series to include a system utility allowing teachers to create and print out material, as well as to generate tests. The series consists of *Bataille de Mots* (French), *Wortgefecht* (German), and *Batalla de Palabras* (Spanish), each $49.95 for the C-64.

Gessler Educational Software, 212-673-3113 (see address list, page 12).

Chance It! uses a TV game show format to encourage students to read for detail by studying paragraphs and then answering questions. A student management system holds up to 200 student files. One C-64 disk, $39.95; with backup, $54.95; class pack $164.95.

Gamco, 800-351-1404; in TX 915-267-6327 (see address list, page 12).

HOW DOES IT RATE?

Overall Rating	**A**
Ease of Use	**A**
Documentation	**A**
Reliability	**A**
Error Handling	**A**
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COMAL Starters Kit rated by The Book of Commodore 64 Software

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Documentation	**8**

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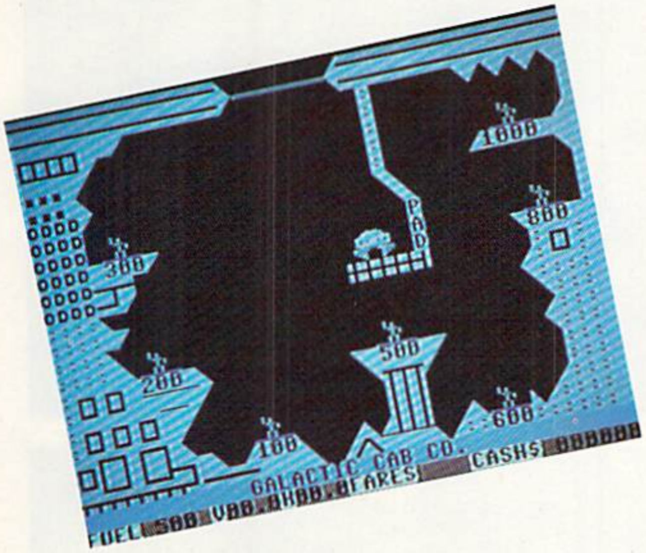
GALACTIC CAB CO.

For the C-128

By Cleveland M. Blakemore



The rusty sound of your dispatcher's voice woke you from slumber as your fusion-powered taxi drifted deep in the asteroid belt on the outer rim. You had been hoping to pick up some space-born amoeboid coming home from a party on the third moon, but things didn't pan out. Slow night.

Your dispatcher, a yellowish arthropod with a severe lisp, was irate. You hadn't responded to calls on the hypernet in over an hour, sleeping away amidst the serene view of slowly turning meteors in the belt.

"Cab twelve! Get down to the Miner's Complex Cavern on the double. They have a bunch of workers changing shifts who need a ride up to the mothership!"

You groaned. The Miner's Industrial Complex Cavern was a dangerous, tricky labyrinth underneath the planet's surface that required nerves of steel to navigate. More than one cabby had bought the farm trying to pick up fares on some of the more narrow platforms. But you knew the money was good, if you didn't get too greedy and overload the cab.

You rolled your ship over and descended down towards the planet...

Galactic Cab Co. is a very difficult "lunar lander" type game that takes place inside a massive cavern underneath the surface of a planet.

The object of the game is to pick up as many people as possible and ferry them through the huge exit at the top. The cavern is enclosed by two steel doors, and the guards are very energy-conscious. They will only open the sliding doors when you have three or more passengers onboard your cab.

With a joystick plugged into Port 2, you fire bursts of exhaust left and right, or straight up, to maneuver around the pick up the gray men waving on the illuminated blue platforms.

Because some of the platforms the workers are standing on are harder to reach, they will pay you more to hover nearby and pick them up at your discretion. Each person you take onboard weighs the taxi down, so it takes more fuel and greater precision to keep from crashing. Each platform is marked with the amount the passenger will pay for a ride. You need only touch the man to allow him to board your taxi. If you land on the platform after the blue light goes out, you'll crash!

You must balance greed with common sense. Since you only have 500 units of fuel per shuttle, you will need to exit and unload when your craft begins to get heavy and you are low on fuel. Only the most expert cabbies can pick up seven fares and make it to the exit on only 500 units of fuel. You may derive some assistance from monitoring the vertical and horizontal trajectories of your cab, displayed at the bottom of the screen.

The doors open and close at intervals, making it a matter of precise timing to pass through safely and drop off your passengers on the mothership offscreen. Each time you make a successful run, you will receive a bonus from each passenger of $1000 for a safe trip. Then your taxi will reappear on the launch pad again, ready for another run.

Since the program uses FAST mode in several lines while setting up the screen, there is the possibility that if your program has an error after copying it in, you will be blind after a break due to an error. The longest delay while the screen blanks is exactly five seconds, at the very beginning. If the screen remains blank longer than that, hit RUN STOP/RESTORE, then print ERR$(ER) to find out where the error was in your version.

If you are like me, you will be amazed at how short a BASIC 7.0 game can be and still be really excellent! It only takes about an hour to copy the game in, at most— but it is addictive and very entertaining. My highest earnings to date have been $45300; you'll have to play quite a while to beat that. The game requires restraint, because there is a big temptation to "go for it" (just one more passenger) even when you're down to 50 units of fuel. ☐

SEE PROGRAM LISTING ON PAGE 84

BIG BLUE READER CP/M

S.O.G.W.A.P. Software, Inc.
C-128 and 1571
Price: $29.95

There comes a time when we must face reality. For reasons beyond our comprehension, we must admit that if you use a computer at your place of business it is most likely an IBM PC or a PC clone. On the other hand, we are pleased to note that the computer in your home is most likely one of Commodore machines. This is apt to be a perfectly satisfactory arrangement until you are faced with the need to take some data files from your office machine and work with them at home. The MFM disk format used by IBM is not compatible with Commodore's GCR format.

The traditional method of transferring data between incompatible computers is via a suitable telecommunications link (see page 51 of this issue). If you own a C-128 with a 1571 disk drive and a copy of *Big Blue Reader CP/M*, you will be able to dispense with tradition. This combination of hardware and software allows for the bilateral transfer of files from the MFM disk format used by IBM to the GCR format used by Commodore.

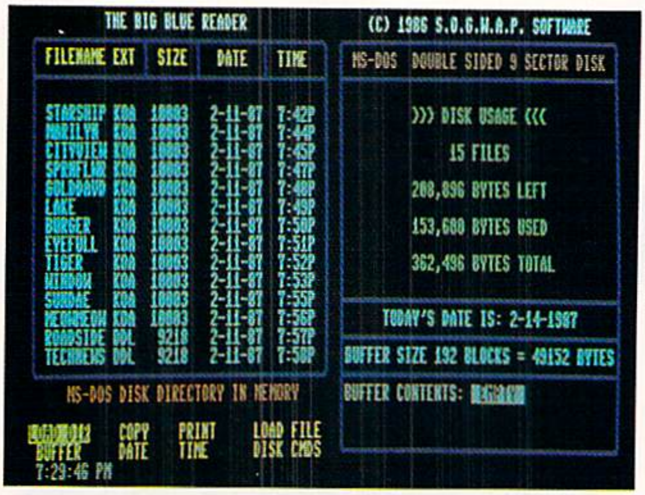
This feat of technological legerdemain is made possible by the versatility of the 1571 disk drive. The 1571, like other Commodore disk drives, is an intelligent peripheral. That is, it contains its own microprocessor (the 6502), its own RAM (2K of the stuff), and its own operating system in ROM (32K worth). This gives the 1571 the ability to organize the disk contents on its own. All the host computer need do is issue a brief command to the drive followed by the transmission or reception of data. The 1571 takes care of all the housekeeping involved in extracting or storing files on the disk surface.

By comparison the disk drives used by other computers are blithering idiots, as their operating systems are stored in the RAM of the host computer whose microprocessor must also handle all the tasks of organizing the file structure on the disk. Even the Amiga disk drives work in this fashion.

What makes the 1571 unique among Commodore disk drives is that it contains the hardware for reading and writing Commodore's GCR format as well as the MFM format used by MS-DOS and most of the CP/M world. In fact, the 1571 can read and write just about any disk format currently in use. The 1571 DOS has also been extended to include a series of commands which allow the drive to automatically detect the MFM format in use as well as to read and write disk blocks. However, just like MS-DOS and CP/M, it is still up to the host computer to keep track of just how the files are stored on the disk surface.

This is where *Big Blue Reader CP/M* comes into the picture. This program contains all the intelligence needed to interpret MFM format disks which contain files stored in the MS-DOS format used by IBM. *Big Blue Reader CP/M* also provides a convenient user interface for transferring files between MS-DOS disks and Commodore GCR disks. As an added bonus, *Big Blue Reader CP/M* will also transfer files between standard Commodore disks and the C-128 CP/M disks in Commodore format. Note that the program will not read MFM format CP/M disks such as those from Epson or Kaypro computers. If you wish to transfer CP/M files from MFM format disks, you will first have to use the PIP command under CP/M to copy the files to a GCR format CP/M disk.

Operation of *Big Blue Reader CP/M* is straightforward. All operations are executed from onscreen menus and prompts. If you have an 80 column display, the screen will be divided into two



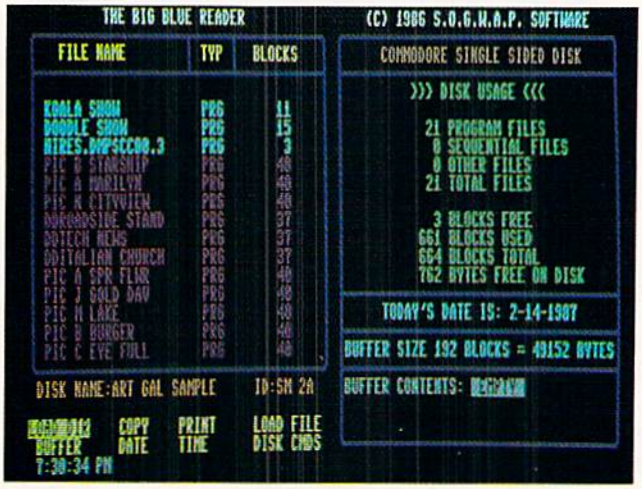
```
        THE BIG BLUE READER               (C) 1986 S.O.G.W.A.P. SOFTWARE
FILENAME EXT | SIZE |   DATE   | TIME    MS-DOS  DOUBLE SIDED 9 SECTOR DISK

STARSHIP KOA  10003   2-11-87  7:42P          ))) DISK USAGE (((
MARILYN  KOA  10003   2-11-87  7:44P
CITYVIEW KOA  10003   2-11-87  7:45P              15 FILES
SPRNFLWR KOA  10003   2-11-87  7:47P
GOLDDAVD KOA  10003   2-11-87  7:48P          208,896 BYTES LEFT
LAKE     KOA  10003   2-11-87  7:49P
BURGER   KOA  10003   2-11-87  7:50P          153,600 BYTES USED
EYEFULL  KOA  10003   2-11-87  7:51P
TIGER    KOA  10003   2-11-87  7:52P          362,496 BYTES TOTAL
WINDOW   KOA  10003   2-11-87  7:53P
SUNDAE   KOA  10003   2-11-87  7:55P
MEOWMEOW KOA  10003   2-11-87  7:56P        TODAY'S DATE IS: 2-14-1987
ROADSIDE DDL   9218   2-11-87  7:57P
TECHNEWS DDL   9218   2-11-87  7:58P   BUFFER SIZE 192 BLOCKS = 49152 BYTES

    MS-DOS DISK DIRECTORY IN MEMORY    BUFFER CONTENTS:

             COPY    PRINT    LOAD FILE
  BUFFER     DATE    TIME     DISK CMDS
 7:29:46 PM
```

MS-DOS directory display on **Big Blue Reader.** *The program contains all the needed intelligence to interpret MFM format disks containing files stored in MS-DOS format. READER SERVICE NO. 221*



```
        THE BIG BLUE READER               (C) 1986 S.O.G.W.A.P. SOFTWARE
  FILE NAME          | TYP |  BLOCKS       COMMODORE SINGLE SIDED DISK

                                              ))) DISK USAGE (((
KOALA SHOW             PRG      11
DOODLE SHOW            PRG      15           21 PROGRAM FILES
HIRES.DMPSCC00.3       PRG       3            0 SEQUENTIAL FILES
PIC B STARSHIP         PRG      40            0 OTHER FILES
PIC A MARILYN          PRG      40           21 TOTAL FILES
PIC K CITYVIEW         PRG      40
DDROADSIDE STAND       PRG      37            3 BLOCKS FREE
DDTECH NEWS            PRG      37          661 BLOCKS USED
DDITALIAN CHURCH       PRG      37          664 BLOCKS TOTAL
PIC A SPR FLWR         PRG      40          762 BYTES FREE ON DISK
PIC J GOLD DAV         PRG      40
PIC M LAKE             PRG      40       TODAY'S DATE IS: 2-14-1987
PIC B BURGER           PRG      40
PIC C EYE FULL         PRG      40   BUFFER SIZE 192 BLOCKS = 49152 BYTES

DISK NAME:ART GAL SAMPLE     ID:SM 2A  BUFFER CONTENTS:

            COPY    PRINT    LOAD FILE
  BUFFER    DATE    TIME     DISK CMDS
 7:30:34 PM
```

Commodore directory display. The purple file names are the **Big Blue Reader** *response to the leading character in a* **Koala** *file name. The screen is split into two windows with an 80 column display.*

PHOTOS BY MORTON KEVELSON

windows as shown in the accompanying photograph. The left window is where all the action takes place. The main menu is directly below this window. Commands are selected by using the cursor keys and hitting RETURN. Direct selection is also available via the function keys which correspond to the location of the screen commands. The right window displays some vital disk statistics. If you have a 40 column screen, only one window will be visible at a time, with the ALT key being used to switch back and forth.

Note that the photograph corresponds to the first release of *Big Blue Reader,* which lacked the CP/M capability. We did most of our work with the first version of the program. The latest release arrived just a few days before we did this review, too late to update our screen photographs. But the screen layouts are similar enough.

The most notable difference between the old and new versions of the program is the elimination of the Buffer and Load File commands. The buffer size is now managed automatically to the maximum available space. This will be 53,248 bytes for an unexpanded C-128 and 479,232 bytes if you have the 1750 RAM expansion module. Note that *Big Blue Reader CP/M* will handle files larger than the available buffer by automatically breaking them up. The Load File command is no longer needed, as files are automatically loaded into the buffer as required. Batch file operations are also supported, as more than one file may be loaded into the buffer at one time.

The menu on the current version of the program includes a View Dir command and a Utilities command. The latter brings up a submenu with three additional choices. The Load Translation Table brings in a 256 byte lookup table to be used when displaying or printing files with the type command. Several translation tables are included on the disk. It seems that this feature was meant to support user-created translation tables; however, the package does not provide any instructions on how to create one. The second submenu choice lets you format an MS-DOS disk. This was a separate utility on the first release of the package. The third selection lets you turn off the 1571's automatic verify when writing a file. This can result in a 30% speedup when saving a GCR file to disk.

The first step in working with a disk in *Big Blue Reader CP/M* is to use the Load Dir command to read the source disk directory into the computer. All subsequent file selections for Copying or Typing are done from this directory. Any number of files may be selected. An important limitation when working with MS-DOS disks is the inability of *Big Blue Reader CP/M* to access files which are not in the disk's root directory. That is, MS-DOS subdirectories are not supported.

When copying files you are given the option of translating from ASCII to PETSCII or vice versa. Files may also be displayed to the screen or sent to the printer with the Type command. In addition to the ASCII translation, the Type command can also be told to follow a user-defined lookup table as mentioned above.

Although *Big Blue Reader CP/M's* Type command will let you display a file, the program has no provision for editing the contents of a file other than the ASCII/PETSCII translation. Many applications, such as word processors, imbed format commands in their text files. These are unique codes which must be edited out before the file can be used by some other application. This editing will have to be done by a separate utility.

Big Blue Reader CP/M will work with two disk drives, one of which must be a 1571. If you have two 1571s, then device 8 will be the source drive and device 9 the destination drive. A 1541 may be used as a second drive for saving only Commodore-format files.

The *Big Blue Reader CP/M* disk is not copy-protected. However, a 65 block file buried in a copyright notice in the disk directory seems to contain the text of Paul's letter to the Ephesians. This does go with the company logo, which happens to stand for Sons Of God With All Power. Who knows? This display of religious fervor may turn out to be a more effective form of copy protection than anything tried before.

Overall we found *Big Blue Reader CP/M* a most useful tool. It did the job for which it was intended, and did it well. The latest release of the package has incorporated some notable improvements over the original version. We could still think of some features and frills to add to the program, but we certainly will not complain about its price. *Big Blue Reader CP/M* gives a good value for your dollar.

S.O.G.W.A.P. Software, Inc., 611 Boccaccio Avenue, Venice, CA 90291 (phone: 213-822-1138).

—Morton Kevelson

RECORD MASTER 128
WOODSoftware
Commodore 128
Disk; $49.95

One complaint still being voiced about the C-128 is the lack of software that takes advantage of 128 mode. While new software for the C-64 is announced almost daily, C-128 packages are few and far between. Since many of the major vendors aren't giving the C-128 much attention, it falls to the smaller vendors to come up with useful, innovative programs.

Record Master is offered by one such company. And while it is useful, it can

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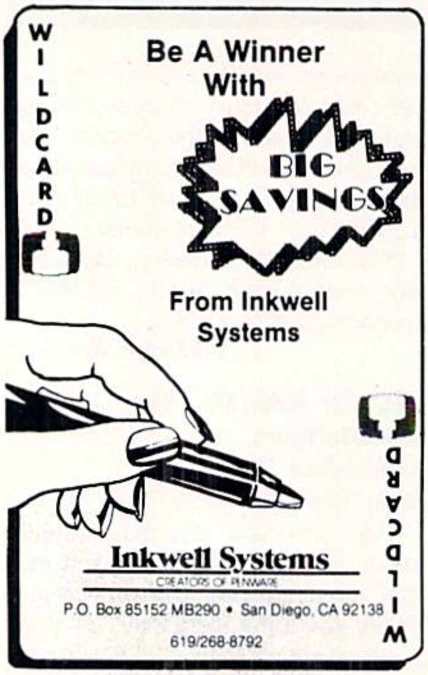
(Outside Continental US add $2.50 per binder. Allow 4 to 6 weeks for delivery.)



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hardly be called innovative. It is a database program that barely contains the minimum of what I would consider necessary management functions. You can create a database, enter the information, save it to disk, and print out the results.

Creating a database is a pain. You're required to declare the maximum number of records in the database and the record size before you enter the field names and sizes. No provision is made for declaring data types for fields. You must declare the number of key fields before you indicate which fields will be key fields. Maybe I've been spoiled by database programs on the Macintosh and Amiga, but to me this is not easy to use.

Entering data into the database is just as troublesome. If you discover a mistake, you can't back up to the problem field with the arrow keys and make the change. Instead you must finish entering the record, answer the "Corrections?" question "Y," and then use the RETURN key to cycle through all the fields to reach the one to edit.

The program is self-booting. It gives you the option of saving sequential or relative files, though the relative file format is the one the program uses as a default.

You can duplicate the last record and then just edit the appropriate fields. The program will allow you to use a previously created database as a model for a new one, so you don't have to rekey all the information.

A mass entry command can be used to prevent disk access after every record is filled out, if you go to the trouble to set up a special file.

I've seen better sort and search features in 64K CP/M programs. You'd think that with 128K the program would at least sort on any and all fields. No. Key fields only, and they recommend limiting the number of key fields. At least you can use some standard math operators: =, < >, >, <. You don't get <= or =>. And you can't use logic operators like AND, OR, and NOT. You can use follows, precedes, and contains. You can pattern match and compare with the value found in another field.

Formatting a report is no easy chore. Fortunately, the report formats can be saved to disk for later use so you needn't recreate the reports each time you want a printout.

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While creating the reports is not a simple process, at least you are given quite a bit of flexibility. Reports can have headers designated and numbers can be aligned on the decimal point fairly easily. Calculations can be done on the data and results can be used in the reports. Reports can be output to a file for access by a word processor. Since the report formatting part of the program is fairly well designed, you may not need this function at all.

Mailing labels are easily done, since the sample report in the manual is a mailing label form. The manual (thirty-six 5" by 7" unbound loose-leaf pages) is barely tolerable. A sample address book is included on the disk, and this is used with a short tutorial section. My copy of the documentation had pages numbered wrong and chapters in random order.

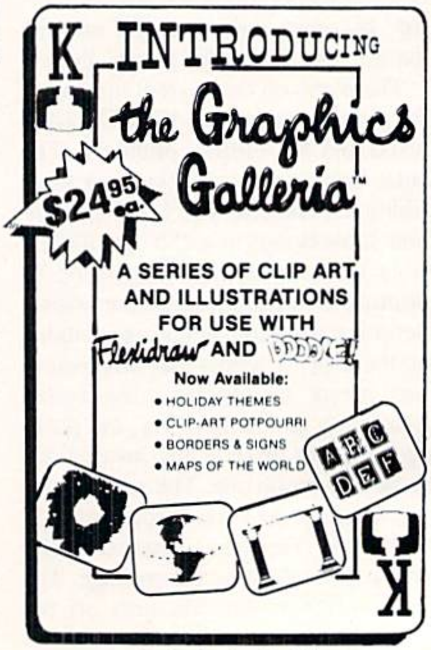
The program has some error checking, but not enough. Error messages are not particularly well conceived. If you exceed the record-size limit, for instance, it merely redisplays the record for changes.

One item really threw me. After using the disk directory command to check disk space, I was confronted by a "Ready" prompt. Yep, it looked very similar to the prompt displayed when a BASIC program finishes execution. I started pressing keys randomly since this wasn't mentioned in the manual. All the obvious things failed: RETURN, ESC, Y, yes. Finally I happened to hit the "R" key and found myself back at the appropriate menu. Whew! If I'd been working with something vital, I would have come totally unglued.

The only other feature that makes this package worthwhile is the fact that you can use a transfer utility included in the Amiga version of the program to copy data from the C-128 to the Amiga. An Amiga-upgrading user will still be able to use the databases created on the C-128.

Conclusion

While I think small software com-



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Database Specifications

Filename	12 characters
Record Size	256 characters, 40 fields
Field Size	79 characters
Field Title	70 characters

panies play an important part in the computer business and much as I like to recommend programs by smaller software companies, there just aren't enough positive factors in this package. There are other database programs sold by the larger companies that offer the same features, but in an easier to use environment.

I was fortunate to get *Record Master* without any previous knowledge. Sometimes it's best to evaluate a program without knowing where it came from or how much it costs. This was definitely one of those cases. By the time I'd finished trying it out, I had a pretty good idea of how much I thought it should sell for. I figured *Record Master* was probably going for about $34.95. On calling WOOD, I was astonished to find that they are asking $49.95.

If it were less expensive, I might be able to recommend it to real penny-pinchers. But $50? I don't think so.

WOODSoftware, P.O. Box 16193, Wichita, KS 67216 (phone: 316-529-1861). *—Cheryl Peterson*

SPEEDTERM 128/64
Abacus Software
Commodore 128 and 64
Disk; $39.95

Speedterm is an inexpensive modem program for the 64 and 128 offering most of the features commonly expected of a terminal package (see sidebar for a list of modems supported). Abacus originally marketed the 128 version separately, but have combined the two, making it unnecessary for buyers to upgrade their software when upgrading their system. This decision deserves a round of applause. Too many companies supporting the 128 try to make customers pay twice for a product that is essentially the same for both machines.

Since it is a command-driven terminal package, *Speedterm* is not the easiest program to learn to use. In testing it out on the Source and CompuServe, I tried doing a few downloads and buffering text for later reading. Though I occasionally had to look up a command in the manual, it wasn't too difficult.

Features

Speedterm has two operating modes: Command and Terminal. Terminal becomes active when it detects carrier on connecting to a remote service. You can perform most of your useful work in this mode. You can buffer incoming data, save the buffer to disk, load data from disk and transmit it out the modem, clear the buffer or the screen, switch from 40 to 80 column mode, or switch to Command mode.

Many of these functions are also available in command mode. Other commands that cannot be accessed from Terminal mode are also available. There are about 30 commands to remember, most of which control file manipulation and communication protocols. Protocol commands change the baud rate (300 or 1200), word length (5, 6, 7, or 8 bits), parity (no, odd, even mark, space), stop bits (1 or 2), and duplex (half or full). *Speedterm* supports Christensen XMODEM and Punter file transfer protocols, but not CompuServe A or B protocol.

From command mode you can also perform disk functions, including viewing the directory and saving and loading files. Text manipulation is also possible using type, extract, and print commands. The extract command is used by specifying a section of text using line numbers that are generated by *Speedterm*. The extracted information is then written to disk. You can save multiple sections, because the data is not removed from the buffer until you issue a "Clear Buffer" command. Though it is a bit inexact, it does allow you to save sections of text for use with a word processor later. Files can be saved in either SEQ or PRG format.

Speedterm offers auto-answer and auto-dial functions with modems capable of these features. The program will convert ASCII to PETASCII and vice versa. One of the few real convenience features it has is autoboot: just put the disk in the drive and turn on the computer and it will load itself in for you. Of course, this only works with the C-128 version.

Documentation

The documentation isn't bad. As with all Abacus programs, the manual is an

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The publisher cannot assume responsibility for errors in the above listing.

8½ by 6" three-ring binder. It contains two short tutorial sections and a reference section outlining all the commands and how they are used. A glossary at the end is especially nice for new modem users who are not familiar with all the terms used in computerized telecommunications. It does have a useful index. A handy command list is included at the back.

Modem Types Supported by *Speedterm 128*

1) Commodore 1600/Hes I
2) Commodore 1650/6420
3) Commodore 1660
4) Mighty-Mo
5) Commodore 1670
6) Hayes Compatible (Includes Volksmodem/Volks 1200)
7) Other

Conclusions

As a no-frills, "let's get down to business" terminal package for those who are basically familiar with using modems, this one is a pretty good buy. Its low price recommends it as the package for those who can handle command-driven terminal packages. This includes many of the lower level techies. Its lack of macro capability will keep the upper level techies looking for something more versatile.

However, I can't recommend this package for beginning modem users. I guess I've gotten spoiled by the concept of menus (pull-down and regular) and online help. Command-driven programs don't make it easy for those who are just starting out.

Though CompuServe has donated its B protocol information to the public domain, making it available to anyone who wishes to include it in their terminal packages, it has not been written into this one. This means downloading for members of CIS must be done using the more complicated XMODEM transfer method. Since it only adds a couple of steps to the download process, many will find it only a minor inconvenience.

For those who are money-conscious, *Speedterm 128* is certainly the way to go. As it is one of the less expensive products on the market, it is a good buy. The inclusion of both the C-64 and C-128 packages in the same box is a great recommendation of the product for those who plan to upgrade their computers.

Abacus Software, P.O. Box 7219, Grand Rapids, MI 49510 (phone: 616-241-5510). *–Cheryl Peterson*

THE ACCOUNTANT

KFS Software, Inc.
Commodore 128
Disk; $149.00

The Accountant from KFS Software has sections for general ledger, accounts receivable, accounts payable, and payroll. It is suitable for small businesses, as is indicated by its limits:

200 general ledger accounts

200 checks per month to no more than 400 general ledger accounts total

30 general journal entries per month posted to no more than 15 accounts per journal entry

60 employees over a one year period

100 customers with up to 300 invoices outstanding; 99 vendors with up to 300 invoices outstanding

Program Requirements

The Accountant runs only on the C-128. Since it requires 80-column mode, you'll need a monochrome or RGB monitor. The programmer recommends a 1571 drive because he has found the 1541 unreliable at processing relative files. Maybe it was luck, but my 1541 never missed a beat during an extensive review. Finally, you need a printer–Star or Epson preferred, though you can manually install the codes for any printer not listed.

Although the program disk is unprotected, *The Accountant* comes with... mothers should cover the eyes of any young children in the room...a dongle. Insert the dongle (a plug) in Port 2 or the program won't run. Are dongles dangerous? I don't think they can hurt your computer, but they could be tough on your back if you lose one behind the filing cabinet.

General Ledger

The first thing you will do in the general ledger section is fix up the chart of accounts. *The Accountant* comes with a sample chart installed. You and your accountant will need to determine what your chart should look like.

Account numbers are limited to the range from 1 to 200 and specific groups of numbers are limited to specific purposes, like 50-69 which must be current liabilities. This numbering system is non-standard and will pose a problem for anyone with an existing accounting system.

When you first set up *The Accountant*, you will enter trial (initial) balances in the general ledger. As you do so, the program will display a running total balance. The option to change the beginning general ledger balances is always available, not just when you first set the program up. Perhaps this should have been part of a separate utility. It would certainly seem dangerous to have an employee keeping your books who can also readily change beginning balances. This could kill an audit trail. You also always have the option to change year-to-date vendor balances. This might better be handled through the general journal, again to preserve an audit trail. Flexibility in changing balances (all too common in computer accounting programs) must be strictly controlled by the user.

Accounts Receivable and Payable

First, note that KFS bills these two modules as "filing systems." Neither is integrated with the general ledger. You will have to record your sales in a sales journal and your expenses in the check register, then make adjusting entries at the end of the month.

In the accounts receivable section, *The Accountant* has no ability to alphabetize your customers. It only offers you the option of switching two customers at a time–kind of a manual bubble sort.

For your accounts receivable invoices, the program will automatically lock out duplicate invoice numbers and will allow you to record partial payments. In either accounts section, you can repeat invoice data from previous fields just by hitting RETURN. To correct invoices, you can hit the V key and scroll the customer accounts.

Payroll

The payroll section probably shows the most attention to detail. It can deal with exemptions, a different number of annual pay periods for each employee, employees with weekly salary and monthly commission checks, and a wide range of deductions. You input employee hours as regular, overtime, or vacation. Overtime is always calculated at time and a half, so double time hours may be a problem.

If you follow specific procedures, the payroll breakdown for each week can be automatically posted to the accounts that you specified when setting up the program.

Reports

The Accountant shines at producing reports. Not only are there some two dozen available, but they are functional reports that are formatted appropriately for many uses. Reports range from simple printouts of employee or customer numbers and the chart of accounts to more complex displays of general ledger details or balances and a financial statement.

If you are starting your bookkeeping system with *The Accountant,* you will probably be fine. But if you already have specific reporting needs, check carefully what is offered. *The Accountant* does not allow you to custom-design reports. And its existing reports follow general formats, but may not meet everyone's needs. Accounts receivable or payable aged analyses, for example, show three timeframes: 30, 60, and over 60 days.

Documentation and Support

These two items offset each other. The documentation is sparse while the support looks to be strong. For documentation you get a 3-ring binder with 62 half-size pages of documentation and a 14-page quick reference guide. The documentation takes you through each of the program's features, but somehow didn't give me a feel for using the program. Perhaps it's because there are no screen displays (just like there is no index). Or perhaps it is because the manual jumps from describing each menu item to attempting to be an accounting tutorial. Both styles are needed, but with more consistency.

My mixed feelings about the documentation were offset by the support offered. For registered users, a help line (not toll free) is available 7 hours a day, 5 days a week. And for $14.95 you'll get a bimonthly newsletter, automatic updates to the manual, tax table updates every December, and notices of program updates. The program updates themselves will cost you a whopping $2.95—the cost of shipping. Now that's the right way for a small company to do support.

Utilities

The Accountant comes with four separate utilities that range from interesting to essential. The first utility allows you to use two drives, one for the program disk and one for the data disk. Those of you with one drive will not be inconvenienced because once the program is loaded and the data disk inserted, no swapping is necessary.

The second utility can print amortization schedules and can display or print payment comparisons for different periods and interest rates. This utility, however, only runs if a printer is connected.

"Create Data Disk" is the third utility. It is particularly useful if you have a 1541 drive. Although *The Accountant* comes formatted for a 1541, its data disk is in 1571 format. Creating all the relative data files on a new data disk takes just over 30 minutes.

The last, and absolutely essential, utility is the one to set up *The Accountant.* Here is where you enter your company information and select or customize printer settings. You must also enter payroll expense classifications and deduction numbers here (from your chart of accounts). You can run setup again to fix those account numbers if you don't know them the first time through, but you must reenter all setup information.

The Accountant is fully menu-driven, but moving among the menus is not consistent. You may have to choose a letter (mnemonic) or a number, backup by hitting "B" or any key, or exit from an option with a return or with a specific letter. Error trapping is also inconsistent. The program handles a disconnected printer well, but random keypresses crashed the program a few times. Preset field lengths may be too short for some users. But the program makes excellent use of screen layout.

The Accountant provides the small businessman who intends to keep his own books with a usable bookkeeping tool. As with any accounting program, the buyer will need to do significant evaluation of his needs before making a purchase.

KFS Software, Inc., 1301 Seminole Blvd. #117, Largo, FL 33540 (phone: 813-584-2355). *—Richard Herring*

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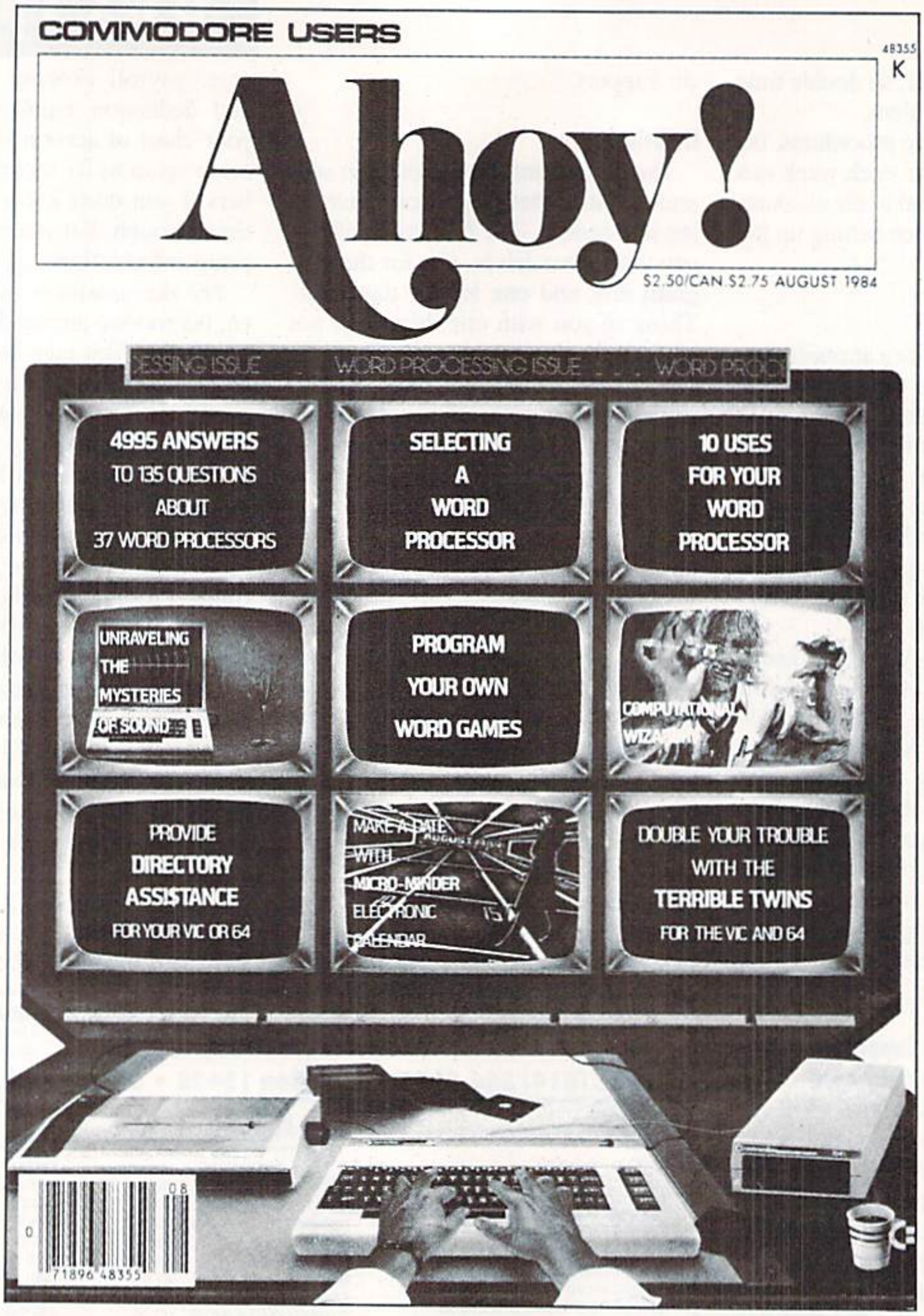

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LITTLE q BUG

Jim Partin has a good Q key CAPS LOCK fix (April '87); good, that is, if you like long programs. Try my simple one liner.

—Gene Ford
Austin, TX

```
10 FAST:BANK15:FORJ=0TO88:POKE6333+J,PEE
K(64484+J):NEXT:POKE840,189:POKE841,24:P
OKE6395,209
```

TRULY FREE

One ordinarily uses the BASIC function "FRE(0)" to find out how much free RAM is available for one's program and/or variables. However, sometimes this gives a negative result. So you must then add 65536 to the negative number to get the correct result. A better way is to use the following statement as outlined in the *Programmer's Reference Guide:*

```
PRINT FRE(0) - (FRE(0))<0)*65536
```

However, using FRE(0) in any of the above ways also causes the computer to perform a garbage collection. This sometimes may not be desired, as it can be quite time consuming and leave the user wondering if the program has crashed. Another method of determining the amount of free memory without invoking garbage collection is to use the following subroutine:

```
1000 EA=PEEK(49)+PEEK(50)*256
1100 BS=PEEK(51)+PEEK(52)*256
1200 FM=BS-EA
1300 PRINT"FREE MEMORY =";FM
1400 RETURN
```

EA is a pointer to the end of arrays +1 and BS is the current bottom of strings. The difference is the amount of unused RAM. I use this subroutine frequently in database programs that I write to keep an eye on memory so that I don't add too many records.

—Barbara Schulak
Pepper Pike, OH

F-KEY 9 & 10

Here is a quick and effective way of redefining the HELP key and SHIFT-RUN STOP key combination on the C-128.

```
SHIFT-RUN/STOP: SYS 24812,,8,,,"string"
 HELP: SYS 24812,,9,,,"string"
```

String should be replaced by your preference for the key in question. It can be longer than the key's current assignment. Furthermore, since this SYS ($60EC) bypasses the syntax checking feature of the KEY command, be careful not to use a number greater than 9 or the definition of the function keys may be corrupted.

—Shawn K. Smith
Bronx, NY

BEAT THE CLOCK

For C-128 owners, here's a quick and dirty onscreen BASIC clock that can be used in a program or by itself, as a timer or just as a time-of-day reminder.

```
10 PUDEF" : ":A$=".##,##,##"

NN1 CHAR,H,V:PRINTUSINGA$;VAL(TI$)/1E6

NN2 CHAR,H,V,"(rvs)":PRINTUSINGA$;VAL(TI
$)/1E6;:PRINT" "
```

In line 10 (which needs to be read only once), the PUDEF redefines the comma as a colon and the decimal point as a blank. In line NN1 (read as needed for updating), CHAR, H,V acts as a PRINT AT command, locating the clock wherever desired onscreen (H=Horizontal, V=Vertical). VAL (TI$) is divided by 1E6 to provide leading zeros for the printout, thus the decimal point. Line NN2 can be used instead of NN1 if a reverse-character clock is needed. "(rvs)" is CONTROL-9.

When A$ is called to format the PRINT USING statement, the decimal point is rendered invisible and the commas are replaced by colons, resulting in a standard HH:MM:SS printout.

—Bob Renaud
Pittsfield, MA

PARTIAL HI-RES

When programming bit-mapped graphics, it is sometimes desirable to put standard characters on the hi-res screen. Plotting them pixel by pixel is too difficult. This machine language routine will put the computer in multicolor bit map mode on the top half of the screen, and standard character mode on the bottom half of the screen. Changing the variable SL in line 10 will change the amount of bit map mode on the screen. For instance, if you change SL to equal 50 only the top quarter of the screen will be in bit map mode. If you change SL to equal 150, three quarters of the screen will be in multicolor bit map mode. Be sure to keep SL in the range of 100 to 200.

—Marty Hermans
Trenton, MI

```
·5 SL=100
·10 FORA=828TO913:READB:POKEA,B:C=C+B:NEX
 T:IFC<>9673THENPRINT"ERROR IN DATA":END
·15 POKE2,SL+50:SYS828
·20 DATA 120,169,88,141,20,3,169,3,141,21
```

```
•30 DATA 3,169,1,141,26,208,169,27,141,17
•40 DATA 208,88,169,127,141,13,220,96,169
 ,1
•50 DATA 141,25,208,162,59,160,216,173,18
 ,208
•60 DATA 197,2,176,9,169,29,141,24,208,16
 5
•70 DATA 2,208,11,162,27,160,200,169,21,1
 41
•80 DATA 24,208,169,0,142,17,208,140,22,2
 08
•90 DATA 141,18,208,173,13,220,41,1,240,3
•100 DATA 76,49,234,76,188,254
```

PRIME NUMBERS

I became interested in prime numbers several months ago when I began proving them in my head as a way to occupy my mind during the 35 to 50 minute drive to work every morning. It soon became apparent that if I expected to prove any large numbers I had to find a better way than doing them in my head at 50 mph in bumper to bumper traffic.

The below-listed program is a prime number finding routine for the 128. It is intended for use in 80 column mode. For 40 column mode or the C-64, delete the fast and slow instructions in lines 20 and 80. This program can return an 8 digit prime number in less than 3 seconds. Some numbers may take several minutes. For example, the computer took 4 minutes to examine the 42 numbers after 99,999,000 before proving 99,999,043 prime. There are also limitations on the smallest and largest numbers which can be proved. The program will not return 1 or 2 as prime and including them would slow the program down appreciably. The computer will not return whole numbers above 999,999,999. Within its limitations, however, this little program can teach one a lot about prime numbers.

—Henry F. Smith
APO Miami, FL

```
•10 INPUT"[CLEAR][3"[DOWN]"][3" "]FIND PR
 IME NUMBERS AFTER ";A
•20 FAST:B=SQR(A):D=2
•30 IFINT(B)=BTHEN90
•40 C=A/D
•50 IFINT(C)=CTHEN90
•60 IFC<BTHEN80
•70 D=D+1:GOTO40
•80 SLOW:PRINTA
•90 A=A+1:GOTO20
```

MOVE IT

The next time you find a need to move a section of memory from one location to another (e.g., swapping hi-res or low-res screens), do it quickly and simply with *Move It*. *Move It* is a machine language utility whch can be placed at any free location in RAM where there are at least 70 available bytes. Also, since the utility uses a built-in BASIC routine, simple or complex formulas may be utilized. To use the utility, you must provide the starting, ending, and new starting address of the area to be moved. For instance, to move the contents of zero page to screen memory, the syntax would be as follows:

```
SYS utility starting addr., 0,255, 1024
```

In this case, memory locations 0 through 255 (256 bytes) are instantly moved to video RAM (1024-1279).

—Shawn K. Smith
Bronx, NY

```
•100 REM* MOVE-IT  -------- SHAWN K. SMITH
•110 S=5555:T=69:PRINT:INPUT"PLACE-AT ";S
•120 FORD=STOS+T:READY:POKED,Y:NEXT:PRINT
•130 PRINT"SYNTAX: SYS"S",START,";
•135 PRINT" END, NEW START
•200 DATA 032,253,174,032,138,173,032,247
•210 DATA 183,132,193,133,194,032,253,174
•220 DATA 032,138,173,032,247,183,132,195
•230 DATA 133,196,032,253,174,032,138,173
•240 DATA 032,247,183,160,000,177,193,145
•250 DATA 020,165,194,197,196,208,006,165
•260 DATA 193,197,195,240,015,230,020,208
•270 DATA 002,230,021,230,193,208,002,230
•280 DATA 194,152,240,225,096,234
```

AUTODRIVE

Are you tired of the ,8 to SAVE and LOAD to and from a disk drive? Tired of "PRESS PLAY ON TAPE"? Tired of....? If you answered "yes" to any of the above questions, kick into *Autodrive!*

Autodrive eliminates the need for the ,8 at the end of the LOAD, SAVE, and VERIFY commands. Sure there are others, but are they RUN STOP/RESTORE proof? They also use up precious memory space. *Autodrive* uses *none* of your memory.

When you run *Autodrive*, it places a temporary ML routine in the cassette buffer to do the RUN STOP/RESTORE-proofing. After that you can do anything you wish with the cassette buffer.

Just LOAD, SAVE, and VERIFY anything on disk. The ,8 is no longer necessary; the disk drive is now the default device! If you would like to LOAD, SAVE, or VERIFY from a disk drive other than number 8, use a comma and the device number.

Note: If you would like to disable *Autodrive,* POKE 1,55 and do a RUN STOP/RESTORE. Reactivation is only necessary after using the disabling procedure above. To reactivate *Autodrive*, run the program, or if the cassette buffer has not been altered, SYS 845.

I have found my routine very useful for my C-64 and disk drive.

—Charles Batson III
Bolingbrook, IL

```
•10 REM AUTODRIVE
•20 CK=.:IFPEEK(817)=228THEN130
•30 FORI=828TO963:READA:POKEI,A:CK=CK+A:N
 EXT:IFCK=19356THENSYS845:GOTO130
•40 PRINT"ERROR IN DATA STATEMENTS!":END
•50 DATA 177,251,145,251,230,251,208,248,
 230,252,165,252,197,253,208,240,96
```

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```
·60 DATA 160,0,132,251,169,160,133,252,16
 9,192,133,253,32,60,3,132,251,132,253
·70 DATA 169,224,133,252,32,60,3,162,0,18
 9,181,3,157,115,228,157,130,228,232
·80 DATA 224,15,208,242,173,48,3,141,128,
 228,173,49,3,141,129,228,173,50,3
·90 DATA 141,143,228,173,51,3,141,144,228
 ,169,115,141,76,253,141,48,3,169,130
·100 DATA 141,78,253,141,50,3,169,228,141
 ,77,253,141,79,253,141,49,3,141,51,3
·110 DATA 169,53,133,1,141,214,253,96,72,
 165,186,201,1,208,4,169,8,133,186,104
·120 DATA 76,102,254
·130 PRINT"[CLEAR][HOME][RVSON] AUTODRIVE
 ACTIVE [RVSOFF]"
·140 PRINT"[DOWN][RVSON]POKE 1,55 AND RUN
 /STOP RESTORE TO[7" "]DEACTIVATE."
·150 PRINT"[DOWN][DOWN]NOTE: RUN/STOP RES
 TORE ALONE WILL [RVSON]NOT[RVSOFF][3" "]
 DEACTIVATE."
```

CHARACTER MOVER

When my knowledge of BASIC became advanced enough to use custom designed characters, I was a bit displeased with the slow process of copying the entire character set into RAM. The only method faster than PEEKin' and POKEin' each individual byte would be to use a machine language routine. Well, it so happens that I don't have the slightest idea how to program anything in machine language.

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Reader Service No. 235

Built into the Commodore's operating system is a routine to do exactly what we want. All you need to do is supply the computer with the appropriate memory pointers and it will move it for you at machine language speed.

This program will do this for you, and takes less than a second instead of the normal 35 seconds for BASIC. Line 10 sets the starting address of the section of memory to be moved and line 20 sets the ending address. Line 30 sets the new starting address. You may change the new starting address to a location that is convenient for you or leave it at 49152. Also you can use this routine to move other sections of memory, such as screen memory. To do this just adjust lines 10, 20, and 30 to the correct values and delete lines 40 and 110. Lines 40 and 110 are necessary when copying from ROM. —Clifford Dedmore
Kaneohe, HI

```
·10 S=53248
·20 E=55296
·30 N=49152
·40 POKE56334,0:POKE1,51
·50 E=E+1:L=E-S:EN=L+N
·60 A%=L/256:A=L-256*A%:B%=(EN-A)/256
·70 B=EN-256*B%-A:C%=(E-A)/256:C=E-256*C%
 -A
·80 POKE781,A%+1:POKE782,A:POKE90,C
·90 POKE91,C%:POKE88,B:POKE89,B%
·100 SYS(41964)
·110 POKE1,55:POKE56334,1
```

SCREEN DIVIDER

You're debugging a BASIC program, and you need to display two sections of the program on the screen at once. You LIST the first section, and it fits adequately, but when you LIST the second section, the first section is scrolled off the top of the screen before you have a chance to tap the RUN STOP key.

Screen Divider solves this problem in a unique manner. It modifies the Scroll Screen routine located at the $E8EA (59626) so that it only scrolls part of the screen. The syntax is SYS 828,n, where n is a number in the range 0 to 24 representing the number of lines to protect from the top of the screen. A value of 24 will scroll only one line, whereas a value of 0 will return the screen to its normal state. —Blaine Burks
Pittsburgh, PA

```
·10 FORI=828TO900:READX:POKEI,X:NEXT
·100 DATA 169,160,133,254,169,0,133,253,1
 69,224,133,252,169,0,133,251
·110 DATA 169,127,141,13,220,169,51,133,1
 ,160,0,162,32,177,251,145
·120 DATA 251,177,253,145,253,200,208,245
 ,230,252,230,254,202,208,238
·130 DATA 169,53,133,1,169,129,141,13,220
 ,32,155,183,138,24,201,25
·140 DATA 144,3,76,72,178,202,142,247,232
 ,96
```

COMMODARES

PROGRAMMING CHALLENGES

By Dale Rupert

Each month, we'll present several challenges designed to stimulate your synapses and toggle the bits in your cerebral random access memory. We invite you to send your solutions to:

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We will print and discuss the cleverest, simplest, shortest, most interesting and/or most unusual solutions. Be sure to identify the *name* and *number* of the problems you are solving. Also show sample runs if possible. Be sure to tell what makes your solutions unique or interesting, if they are.

Programs on diskette (1541 format only) are welcome, but they must be accompanied by listings. You must enclose a stamped, self-addressed envelope if you want any of your materials returned. Solutions received by the middle of the month shown on the magazine cover are most likely to be discussed, but you may send solutions and comments any time. Your original programming problems, suggestions, and ideas are equally welcome. The best ones will become *Commodares*!

PROBLEM #42-1: INTERNAL DELETION

This problem was submitted by Andrew P. Thompson (AKA Mad Quoter). The problem is to have a program delete one of its lines after executing it, and then continue running. Add your solution beginning in line 30 of this program to delete line 20.

```
10 PRINT 10
20 PRINT 20
30 (your solution here)
40 LIST
```

When this program is run, it should execute lines 10 and 20, then delete line 20. Execution continues with line 40 which shows line 20 is no longer part of the program.

PROBLEM #42-2: CLIFF HANGER

Even novices will enjoy solving this one suggested by Scott McClare (Espanola, Ontario). A log is suspended between two cliffs. A man is standing at the midpoint of the log. He randomly shuffles left or right. He reaches safety if he ends up ten units away from the midpoint in 25 shuffles or less. (After 25 shuffles, he falls off from exhaustion.)

Picture the log marked from left to right with positions 0 through 20. The man starts at position 10. If he reaches position 0 or 20 in 25 random moves or fewer, he is safe. As a minimum, your program should print "Shuffle Left" or "Shuffle Right" for each move. Then it should print "Safe on Left", "Safe on Right", or "Fell off at position X" to indicate the outcome. Advanced solutions should include some graphical output. (Keep in mind that compact solutions are most appropriate for *Commodares.)*

PROBLEM #42-3: WILDCARD WORD

Try this one from Norm Green (Perth, Ontario). The user types a word with one or more letters missing, with each missing letter replaced by an asterisk. The computer searches through a word list in DATA statements and prints all words which match. Assume the DATA statement contains LIST, LOOK, LOST, and LAZY. If the user types L**T, the program responds with LIST and LOST. LO** returns LOOK and LOST. *E** returns "No match found."

PROBLEM #42-4: DOUBLE SUBBER

Solve this one from Danny Faught (Sherman, TX). Write a program to encode or decode a message in the following manner. Assume the message word to be encoded is *Commodares* and the substitution codes are AHOY and ION. The two codes are repeated (or truncated) under the message like this:

```
COMMODARES
AHOYAHOYAH
IONIONIONI
```

Then the letters in each column are added, with results greater than "Z" wrapping back around to "A". The first character would be "C" + "A" + "I" which is "M" (3+1+9=13). The second character is "O" + "H" + "O" which is "L" (15+8+15=38; 38−26=12). So the encoded COMMODARES is MLPUEZYFTJ. To decode a word, it and the two substitution codes are entered with the computer printing the results. HKR, AHOY, AHOY is decoded as FUN.

This month we will look at the most interesting solutions to the February 1987 *Commodares.* It is always amazing that there are so many ways of solving even the most uncomplicated problems. Steven Steckler (Columbia, MD) suggested *Problem #38-1: Parm Pass.* The problem is for a numeric variable between 0 and 65535 to be defined in one program. That program then loads and runs a second program which obtains the value of that variable one way or another.

How many ways would you expect that such a task could be accomplished? There were no fewer than eight fundamentally different approaches to this problem. They are summarized:

1. POKE the value into safe memory, then PEEK it.
2. Save the value in a sequential file, then INPUT it.
3. Use the dynamic keyboard buffer to INPUT the value.

4. Just make sure that the second program is shorter than the first, and the variable will automatically be available to the second program.

5. Use the screen as device #3 and INPUT from it.

6. Directly modify the second program on the disk before loading it.

7. Write the value to normally unused bytes in the BAM on disk (bytes 244 and 245 of track 18 sector 0).

8. Use a machine language routine to stuff the parameter into the variable storage area of the second program.

Method 4 is the easiest. A LOAD command from within a program causes the second program to be loaded and executed. More important, it does not reset the variables if the second program is not any longer than the first one. Lon Olson (Mesa, AZ) pointed out that on the C-128, the relative lengths of the programs do not matter. That is because the C-128's variables are stored safely up in the second 64K block of RAM, out of the way of program storage.

These two programs from Jim Speers (Niles, MI) utilize this technique with a special twist. The two programs are the same length. After the second program is loaded and run, it in turn loads the first, and the cycle is repeated.

```
 1 INPUTX:LOAD"P2",8
```

```
1 PRINTX:LOAD"P1",8
```

The first line should be saved as P1, and the second one saved as P2. Since they are the same length, they will work on the C-64 or the C-128. You may replace X with X$ in both programs for more flexibility, allowing anything to be passed from one program to the other.

This program from Joseph Wright (Louisville, KY) uses method 3. It puts a carriage return (CHR$(13)) into the keyboard buffer and puts a 1 into the buffer counter to indicate that a character is available. Line 20 does this for the C-64 and line 30 does it for the C-128. Line 40 clears the screen and prints the value of the variable A beginning in the second column of the top line of the screen.

```
•1 REM ==================================
•2 REM     COMMODARES PROBLEM #38-1 :
•3 REM     PARM PASS
•4 REM     SOLUTION BY
•5 REM     JOSEPH WRIGHT
•6 REM ==================================
•7 REM        ==== SAVE 10-40 AS PRG1 =====
•10 INPUT"WHAT IS A";A
•20 IF DS$="" THEN POKE 198,1:POKE 631,13
  : GOTO 40
•30 POKE 208,1 : POKE 842,13
•40 PRINT"[CLEAR]  ";A:LOAD"PRG2",8
•44 REM
•45 REM        === SAVE 50-60 AS PRG2 =====
•46 REM
•50 A=0:INPUT"[HOME]";A
•60 PRINT"A IN PRG2="A
```

Lines 10 through 40 should be saved as PRG1. Line 50 and 60 should be saved as a separate program PRG2. PRG2 executes the INPUT statement which HOMEs the cursor and requests A. The carriage return in the keyboard buffer causes the value printed at the top of the screen to be automatically entered into the variable A in response to the INPUT statement in line 50.

Although we normally think of the screen only as an output device, on the C-64 it can be used for input as well. A bug in the C-128 (described in *Mapping the Commodore 128* by Ottis Cowper, COMPUTE! Books, 1986) prevents the use of this technique. This program by Paul Sobolik (Pittsburgh, PA) demonstrates how methods 2 and 5 are implemented.

```
•1 REM ==================================
•2 REM     COMMODARES PROBLEM #38-1 :
•3 REM     PARM PASS
•4 REM     SOLUTION BY
•5 REM     PAUL SOBOLIK
•6 REM ==================================
•7 REM   ---------METHOD 2------------
•8 REM ----SAVE LINE 10-30 AS PROG1------
•10 INPUT P1 : OPEN 8,8,8,"PARM.SEQ,S,W"
•20 PRINT#8,P1 : CLOSE 8
•30 LOAD"PROG2",8
•35 REM----SAVE LINES 40-60 AS PROG2-----
•40 OPEN 8,8,8,"PARM.SEQ,S,R"
•50 INPUT#8,P2 : PRINT"IN PROG2, P2=";P2
•60 CLOSE 8
•70 OPEN 15,8,15,"S0:PARM.SEQ":CLOSE 15
•74 REM
•75 REM  ---METHOD 5 (C64 ONLY)---
•76 REM -----SAVE LINES 80-90 AS PROG3---
•80 INPUT P3 : PRINT"[CLEAR]"P3
•90 LOAD"PROG4",8
•95 REM -----SAVE LINES 100-110 AS PROG4--
•100 PRINT"[HOME]";:OPEN 3,3 : INPUT#3,P4
•110 CLOSE 3 : PRINT"IN PROG4, P4=";P4
```

Save the parts of this listing as four separate programs, then run PROG1. Give a value for the parameter. PROG1 writes the value to a sequential file called "PARM.SEQ" and loads PROG2. PROG2 reads the data in PARM.SEQ and prints it. Line 70 of PROG2 scratches the file.

On the C-64 only (or C-128 in C-64 mode), run PROG3 and give a value for the parameter. PROG3 prints it at the top of the screen, then loads PROG4. PROG4 HOMEs the cursor, then opens the screen (device #3). The INPUT#3 reads the value on the screen into P4, then line 110 prints the value.

Method 1 is quite straightforward. The other methods we haven't discussed are more complicated and provide no real advantages. For passing large numbers of parameters, the sequential file method is best. For the C-128, method 4 is clearly best. It is also fine for the C-64 if the second program is always shorter than the first.

Just what solution did Carmen Artino (Guilderland, NY) have in mind when suggesting *Problem #38-2: Crafty Comparison?* The idea is to determine the largest of four given numbers without using any conditional, comparison, or Boolean statements. Carmen's solution is listed here.

```
•1 REM ===================================
•2 REM    COMMODARES PROBLEM #38-2 :
•3 REM    CRAFTY COMPARISON
•4 REM    SOLUTION BY
•5 REM    CARMEN ARTINO
•6 REM ===================================
•7 PRINT"[CLEAR]INPUT 4 NUMBERS, ONE AT A
 TIME"
•10 FOR J=0 TO 3 : INPUT X
•20 N(J)=X : NEXT J
•30 M=N(0)
•40 FOR J=1 TO 3
•50 M=(ABS(N(J)-M) + N(J) + M)/2
•90 NEXT J
•99 PRINT M "IS THE LARGEST VALUE"
```

Line 50 with the absolute value function is the heart of the program. Carmen points out that, for any two numbers A and B, if A > B, then A − B > 0 so that ABS(A − B) = A − B. Therefore ABS(A − B) + A + B equals A − B + A + B which is just 2*A. Dividing the result by 2 gives A which is the larger value. Use the same method to prove the formula if A < B or if A = B. Also you may change the function to (−ABS(A − B) + A + B)/2 to find the smaller value.

I inadvertently made the problem seem trickier than was intended by putting the NEXT J statement in line 90 after the reader's solution. Many readers went to great pains to initialize M to the smallest possible value before performing the comparisons. Otherwise if all negative numbers were entered, the result would have been zero, the initial value of M. Line 30 of Carmen's solution initializes M to the first value entered.

Several readers used the ON/GOTO command to avoid conditional tests, although many admitted that ON/GOTO was in itself conditional. Many of the solutions used the SGN function instead of the ABS function. You could replace line 50 above with this line from David Hoffner (Brooklyn, NY):

```
50 M = M + (N(J) - M) * (1 + SGN(N(J) -
M)) / 2
```

Look up the definition of the SGN (signum) function if you are not familiar with it.

The neatest way to initialize M is shown in this example from William Brant (Rochester, NY). Delete lines 20 through 50 of the program above and include this line 20:

```
20 M = X + (1 + SGN(M-X)) * (M - X) * SG
N(J) / 2
```

Notice how this cleverly assigns the first value of X to M. Since J is initially zero, SGN(J) and the entire right hand addend are zero. For other values of J, this expression will be equivalent to David's expression in line 50 above when N(J) is replaced with X.

Those of you interested in esoteric tidbits (aren't we all?) will enjoy this solution from Paul Vaughan (San Jose, CA) for the C-64.

```
•1 REM ===================================
•2 REM    COMMODARES PROBLEM #38-2 :
•3 REM    CRAFTY COMPARISON
•4 REM    SOLUTION BY
•5 REM    PAUL VAUGHAN
•6 REM ======   C64 ONLY    ==============
•9 INPUT N(2)
•10 INPUTN:N(1+SGN(N-N(2)))=N:PRINT"[UP]"
 N"[LEFT]  LARGEST SO FAR ="N(2):N=10+PEE
 K(646)
•11 POKE 785,188:POKE 786,168:POKE N,PEEK
 (N):N=USR(0)
•12 PRINT"DONE"
```

This program allows any number of values to be entered, one at a time. N(2) stores the largest value found so far. After you enter the second and each succeeding number, the value of N(2) is displayed. If an entered value is smaller than the current maximum, it is stored in N(0) which is ignored.

The uniqueness of this program comes from the computed GOTO in line 11 which Paul credits to Randy Thompson in the *Run* 1986 special issue. The line number to GOTO is stored in N and it is dependent upon the current screen color. Black sends the program back to line 10, red sends

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it to line 12 (the problem said to avoid explicit conditional statements). Press BLACK (Control−1) before entering the first number. Before entering the last number, press RED (Control−3). The program goes to line 12 once the current foreground color is red. Very interesting indeed.

Problem #38-3: Alpha Sprite as suggested by Jim Speers (Niles, MI) was fun for a lot of readers. The idea is to put an alphanumeric character in the upper left hand corner of the screen then have the program capture this character, converting it into a sprite, and then magnifying the sprite to twice its original height and width.

This program by Jim Speers, from which the *Commodare* was extracted, allows the user to enter any message. The characters of the message are colorfully displayed in marquee fashion.

```
•1 REM ==================================
•2 REM    COMMODARES PROBLEM #38-3 :
•3 REM    ALPHA SPRITE
•4 REM    ENHANCED SOLUTION BY
•5 REM    JIM SPEERS
•6 REM ==================================
•100 DIM A$(64) : COLOR 0,1 : COLOR 1,2 :
 COLOR 4,13 : COLOR 5,2
•110 POKE 842,34:POKE 208,1:INPUT"[CLEAR]
[DOWN][DOWN]ENTER YOUR TEXT";M$
•120 GRAPHIC 1,1:FOR I=1 TO 64
•130 CHAR 1,0,0,CHR$(I+31):SSHAPE A$(I),0
,0,23,20
•140 NEXT I : GRAPHIC 0,1
•150 C=32 : R=50 : SC=4
•160 FOR Z=1 TO 8 : SPRITE Z,0 : NEXT
•170 J=1 : FOR K=1 TO 12
•180 FOR I=1 TO LEN(M$) : X=ASC(MID$(M$,I
,1))-31
•190 IF X=1 THEN C=C+16 : GOTO 210
•200 SPRITE J,0 : SPRSAV A$(X),J : MOVSPR
 J,C,R : SPRITE J,1,SC,0,1,1 : C=C+16 :
J=J+1 : IF J=9 THEN J=1
•210 IF C>320 THEN C=32 : R=R+16
•220 IF R>229 THEN R=50 : C=32
•230 FOR Z=1 TO 10 : NEXT Z
•240 NEXT I : SLEEP 2 : FOR I=1 TO 8 : SP
RITE I,0 : NEXT : SLEEP 1
•250 COLOR 0,RCLR(0)+1 : SC=SC+1
•260 NEXT K : FOR I=1 TO 8 : SPRITE I,0 :
 NEXT : COLOR 0,12 : COLOR 4,14 : COLOR
5,14 : END
```

Lines 120-140 create an array of shapes of all characters from CHR$(32) to CHR$(95). The CHAR command displays them on the screen, and the SSHAPE command saves each image in A$. SPRSAV in line 200 puts the next A$ data into the selected sprite. MOVSPR gives the position of the sprite on the screen, and SPRITE puts it there. SC is the sprite color. You may change the speed of the display in line 230. Only eight characters at a time are visible, but the entire message is readable as it scrolls.

The solutions for the C-64 PEEKed into the character ROM to determine the pixels for each character shape. This program from Danny Faught (Sherman, TX) reads the character ROM.

```
•1 REM ==================================
•2 REM    COMMODARES PROBLEM #38-3 :
•3 REM    ALPHA SPRITE
•4 REM    SOLUTION BY
•5 REM    DANNY FAUGHT
•6 REM =====   FOR C64 ONLY   ===========
•7 REM ==================================
•10 FORX=0 TO 7:READ C(X):NEXT:DATA 128,0
,192,223,64,192,128,192
•20 FOR X=832 TO 895:POKEX,0:NEXT:PRINT"[
CLEAR]  [BACKARROW]PRESS A KEY"
•30 GET A$:IF A$="" THEN 30
•40 A=(ASC(A$)+C(ASC(A$)/32))AND255 :POKE
 1024,A : P=-2048*(PEEK(53272)=23)
•50 POKE 56334,0 : POKE 1,51
•60 FOR X=0TO7:POKE 832+X*3,PEEK(53248+8*
A+X+P):NEXT
•70 POKE 1,55:POKE 56334,1
•80 V=53248 :POKE 2040,13:POKE V,100:POKE
 V+1,100:POKE V+23,1:POKE V+29,1
•90 POKE V+21,1:GOTO 30
```

Line 10 creates a table of ROM offsets for converting ASCII data to screen data. Danny explained that ASCII and screen codes are composed of 8 blocks of 32 characters each. To convert an ASCII code to its screen code, the ASCII value is added to the offset of the 32 byte block of character ROM in which it is located, and the result is ANDed with 255 to get a value from 0 to 255. Line 20 clears the 64 byte block of memory at address 832 (the cassette buffer where the sprite will be stored), and prints a prompt.

The character is read by line 30. Line 40 displays it in the upper left corner of the screen. Line 50 turns off the IRQ's (interrupt requests) then switches in the character ROM which now begins at address 53248. (Start on page 103 of the C-64 *Programmer's Reference Guide* for a detailed explanation of all this.) P determines whether the uppercase/graphics or lowercase/uppercase character set is used. The ROM data is POKEd into every third byte of sprite data block 13 starting at address 832. Line 70 returns the computer to normal.

Line 80 points sprite 0 to block 13, puts it at x,y coordinates 100,100, and expands it horizontally and vertically. And finally, line 90 turns the sprite on and goes back for another character.

There were many other nicely done solutions to this problem. Here is a "one-liner" for the C-128 from Timothy Berry (Arlington, TX) that meets the basic requirements of the problem.

```
•1 REM ==================================
•2 REM    COMMODARES PROBLEM #38-3 :
•3 REM    ALPHA SPRITE
•4 REM    SOLUTION BY
•5 REM    TIMOTHY BERRY
```

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```
•6 REM =====    FOR C128 ONLY    ===========
•10 GRAPHIC1,1:CHAR1,0,5,"CHARACTER:":GET
 KEYA$:IFA$=" "THENGRAPHIC0:ELSECHAR1,0,0
 ,A$:SSHAPEA$,0,0,20,20:SPRSAVA$,1:MOVSPR
 1,150,100:SPRITE1,1,4,0,1,1,0:GOTO10
```

Simply press the space bar in order to return to the text screen.

Several readers figured out the solution to *Problem #38-4: Maximum Square* in their heads. The problem is to arrange the digits 1 through 9 in a three by three square such that the sum of the products of the numbers in each row is a maximum.

The solution is the ordered square:

1 2 3

4 5 6

7 8 9

with a total of 630. Neither the order of the characters in each row nor the order of the rows matters. Readers who solved the problem in their heads reasoned that the solution must contain the maximum number of 8*9's possible, which is 7. Using the numbers remaining, the next row must contain the maximum number of 5*6's which is 4, and so forth.

Ray Carter (Las Cruces, NM) sent COMAL and FORTRAN solutions which run in 27.5 seconds and 2 seconds respectively. Ray pointed out that there are only 280 distinct squares, since the order of the numbers within a row doesn't matter. Ray also pointed out that the answer to the opposite problem is more interesting, namely find the square with the *smallest* sum of row products.

This solution from Jim Speers (Niles, MI) tests all combinations of the nine digits.

```
•1 REM ==================================
•2 REM     COMMODARES PROBLEM #38-4 :
•3 REM     MAXIMUM SQUARE
•4 REM     SOLUTION BY
•5 REM     JIM SPEERS
•6 REM ==================================
•100 FORA=1TO7:FORB=A+1TO8:FORC=B+1TO9
•110 IA(A)=1:IA(B)=1:IA(C)=1
•120 N=1:FORI=1TO9:IFIA(I)=1THEN140
•130 IB(N)=I:N=N+1
•140 NEXTI
•150 FORD=1TO4:FORE=D+1TO5:FORF=E+1TO6
•160 N=1:K=1:FORI=1TO6:IF(D=IORE=IORF=I)T
 HENX(N)=IB(I):N=N+1:GOTO200
•170 Y(K)=IB(I):K=K+1
•200 NEXTI:R=A*B*C:S=X(1)*X(2)*X(3):T=Y(1
 )*Y(2)*Y(3):Q=R+S+T
•210 IFQ>MTHENM=Q:PRINTA;B;C;"="R:FORI=1T
 O3:PRINTX(I);:NEXT:PRINT"=";S:FORI=1TO3:
 PRINTY(I);:NEXT:PRINT"=";T:PRINT"TOTAL="
 ;M:PRINT"[3"[DOWN]"]"
•220 NEXTF,E,D
•230 FORI=1TO9:IA(I)=0:NEXTI
•240 NEXTC,B,A
```

Line 100 creates all possible three-number combinations of nine digits. For each combination, lines 110-140 create an array IB of the remaining six numbers. From this array, lines 150-200 calculate all possible three-digit combinations (array X) along with the remaining three-digit combination (array Y). It turns out that the final answer is found and displayed right away. Since all other squares are checked, the answer is printed and the computer thinks quietly for seven more minutes, checking all other possibilities, then stops.

You may easily modify Jim's program to find the minimum sum of row-products (214) by adding line 90 M=630, and by changing the ">" in line 210 to "<". Each time a square with a result smaller than the previous minimum is found, it is displayed on the screen. The final display is the answer. Is this a unique result or are there several distinctly different squares that give this minimum?

Here is a list of all the readers not already mentioned this month who sent solutions or problems to *Commodares.* Please be sure to include your address with your listing. The envelopes are discarded and some readers' addresses go with them.

Mark Aspinall (Alexandria, IN)
Tom Barber (Toledo, OH)
Gary Bond (Topeka, KS)
Thomas Braun (Omaha, NE)
Duane Bullard (Fortson, GA)
Sumir Chadha (New York, NY)
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M. Sheridan (Fairbanks, AK)
Fred Simon (Gibbsboro, NJ)
J.H. Smalley (Boulder, CO)
Harold Spangler, Jr. (Leola, PA)
C. Stolberg (Traverse City, MI)
Andrew Thompson
Richie Vance (Buchanan, TN)
Paul Vaughan (San Jose, CA)
Joe Walker
Richard Warnk & Igor (Cockeysville, MD)
L. Whittenburgh (Fayette, AL)
Jonathan Youse (Virginville, PA)

We have one more contender for the Longest Listable Line for the C-64. Scott Gray (New Bloomfield, NJ) builds on Jim Borden's patches to the LIST command and uses some other twists. Scott claims that his method expands 38,904 tokens in memory, each generating 255 characters to be listed, with the result that over 9.9 million characters are printed (in just over 3 hours). If you are interested in Scott's solution and explanation, send me a self-addressed, stamped, legal-size envelope with your request clearly stated.

Have fun with this month's problems. Keep those solutions and challenges coming. ☐

PROGRAM LISTINGS

Attention new *Ahoy!* readers! You must read the following information very carefully prior to typing in programs listed in *Ahoy!* Certain Commodore characters, commands, and strings of characters and commands will appear in a special format. Follow the instructions and listings guide on this page.

On the following pages you'll find several programs that you can enter on your Commodore computer. But before doing so, read this entire page carefully.

To insure clear reproductions, *Ahoy!'s* program listings are generated on a daisy wheel printer, incapable of printing the commands and graphic characters used in Commodore programs. These are therefore represented by various codes enclosed in brackets [ ]. For example: the SHIFT CLR/HOME command is represented onscreen by a heart . The code we use in our listings is [CLEAR]. The chart below lists all such codes which you'll encounter in our listings, except for one other special case.

The other special case is the COMMODORE and SHIFT characters. On the front of most keys are two symbols. The symbol on the left is obtained by pressing that key while holding down the COMMODORE key; the symbol on the right, by pressing that key while holding down the SHIFT key. COMMODORE and SHIFT characters are represented in our listings by a lower-case "s" or "c" followed by the symbol of the key you must hit. COMMODORE J, for example, is represented by [c J], and SHIFT J by [s J].

Additionally, any character that occurs more than two times in a row will be displayed by a coded listing. For example, [3 "[LEFT]"] would be 3 CuRSoR left commands in a row, [5 "[s EP]"] would be 5 SHIFTed English Pounds, and so on. Multiple blank spaces will be noted in similar fashion: e.g., 22 spaces as [22 " "].

Sometimes you'll find a program line that's too long for the computer to accept (C-64 lines are a maximum of 80 characters, or 2 screen lines long; C-128 lines, a maximum of 160 characters, 2 or 4 screen lines in 40 or 80 columns respectively). To enter these lines, refer to the *BASIC Command Abbreviations Appendix* in your User Manual.

On the next page you'll find our *Bug Repellent* programs for the C-128 and C-64. The version for your machine will help you proofread programs after typing them. (Please note: the *Bug Repellent* line codes that follow each program line, in the whited-out area, should *not* be typed in. See instructions preceding each program.)

On the second page following you will find *Flankspeed*, our ML entry program, and instructions on its use.

Call *Ahoy!* at 212-239-6089 with any problems (if busy or no answer after three rings, call 212-239-0855).

WHEN YOU SEE	IT MEANS	YOU TYPE	YOU WILL SEE
[CLEAR]	Screen Clear	SHIFT CLR/HOME	♥
[HOME]	Home	CLR/HOME	S
[UP]	Cursor Up	SHIFT ↑ CRSR ↓	☐
[DOWN]	Cursor Down	↑ CRSR ↓	Q
[LEFT]	Cursor Left	SHIFT ← CRSR →	▌
[RIGHT]	Cursor Right	← CRSR →	]
[SS]	Shifted Space	SHIFT Space	■
[INSERT]	Insert	SHIFT INST/DEL	▌
[DEL]	Delete	INST/DEL	T
[RVSON]	Reverse On	CNTRL 9	R
[RVSOFF]	Reverse Off	CNTRL 0	■
[UPARROW]	Up Arrow	↑	↑
[BACKARROW]	Back Arrow	←	←
[PI]	PI	π	π
[EP]	English Pound	£	£

WHEN YOU SEE	IT MEANS	YOU TYPE	YOU WILL SEE
[BLACK]	Black	CNTRL 1	▮
[WHITE]	White	CNTRL 2	E
[RED]	Red	CNTRL 3	£
[CYAN]	Cyan	CNTRL 4	◣
[PURPLE]	Purple	CNTRL 5	▒
[GREEN]	Green	CNTRL 6	↑
[BLUE]	Blue	CNTRL 7	←
[YELLOW]	Yellow	CNTRL 8	π
[F1]	Function 1	F1	■
[F2]	Function 2	SHIFT F1	▜
[F3]	Function 3	F3	▬
[F4]	Function 4	SHIFT F3	▙
[F5]	Function 5	F5	▌
[F6]	Function 6	SHIFT F5	▟
[F7]	Function 7	F7	▐
[F8]	Function 8	SHIFT F7	▙

BUG REPELLENT FOR THE 64 & 128 By BUCK CHILDRESS

Please note: the *Bug Repellent* programs listed here are for *Ahoy!* programs published from the May 1987 issue onward! For older programs, use the older version.

Type in, save, and run *Bug Repellent*. You'll be asked if you want automatic saves to take place. If so, you're prompted for the device, DISK (D) or TAPE (T). You then pick a starting file number, 0 through 99. Next, you enter a name, up to 14 characters long. At this point, *Bug Repellent* verifies your entries and gives you a chance to change them if you want. If no changes are needed, *Bug Repellent* activates itself. (Pressing RETURN without answering the prompts defaults to disk drive and begins your files with "00BACKUP".)

As you enter program lines and press RETURN, a *Bug Repellent* code appears at the top of your screen. If it doesn't match the code in the program listing, an error exists. Correct the line and the codes will match.

If used, automatic saves take place every 15 minutes. When the RETURN key is pressed on a program line, the screen changes color to let you know that a save will begin in about three seconds. You may cancel the save by pressing the RUN STOP key. The file number increments after each save. It resets to 00 if 99 is surpassed. After saving, or cancelling, the screen returns to its original color and the timer resets for 15 minutes.

When you've finished using *Bug Repellent*, deactivate it by typing SYS 49152 [RETURN] for the Commodore 64 or SYS 4864 [RETURN] for the Commodore 128.

C-64 BUG REPELLENT

```
·10 PRINTCHR$(147)"LOADING AND CHECKING THE DATA[3"."]":J
=49152
·20 FORB=0TO11:READA:IFA<0ORA>255THEN40
·30 POKEJ+B,A:X=X+A:NEXTB:READA:IFA=XTHEN50
·40 PRINT:PRINT"ERROR IN DATA LINE:"PEEK(64)*256+PEEK(63)
:END
·50 X=0:J=J+12:IFJ<49456THEN20
·60 POKE198,0:POKE49456,0:A$="Y":B$=A$:C$="D":D$="DISK":D
=8:PRINTCHR$(147)
·70 INPUT"DO YOU WANT AUTOMATIC SAVES (Y/N)";A$:PRINT:IFA
$="Y"THEN90
·80 PRINT"NO AUTOMATIC SAVES[3"."]":GOTO150
·90 POKE49456,1:INPUT"DISK OR TAPE (D/T)";C$:IFC$<>"D"THE
ND=1:D$="TAPE"
·100 POKE49457,D:D$=D$+" DRIVE":PRINT:INPUT"FILE NUMBER (
0-99)";N
·110 N$=RIGHT$(STR$(N),2):IFN<10THENN$=CHR$(48)+CHR$(N+48
)
·120 F$="BACKUP":PRINT:INPUT"FILENAME";F$:F$=N$+LEFT$(F$,
14):L=LEN(F$)
·130 POKE49458,L:FORJ=1TOL:POKE49458+J,ASC(MID$(F$,J,1)):
NEXTJ:PRINT
·140 PRINT"SAVING DEVICE ** "D$:PRINT"STARTING WITH ** "F
$
·150 PRINT:INPUT"IS THIS CORRECT (Y/N)";B$:IFB$<>"Y"THEN6
0
·160 POKE770,131:POKE771,164:SYS49152:END
·170 DATA169,79,32,210,255,162,38,160,192,204,3,3,1507
·180 DATA208,10,162,131,160,164,169,70,32,210,255,44,1615
·190 DATA169,78,32,210,255,142,2,3,140,3,3,76,1113
·200 DATA36,193,32,96,165,134,122,132,123,32,115,0,1180
·210 DATA170,240,243,162,255,134,58,144,3,76,150,164,1799
·220 DATA32,107,169,32,121,165,173,0,2,240,5,169,1215
·230 DATA79,141,2,3,76,162,164,169,0,133,2,133,1064
·240 DATA251,133,252,133,254,24,101,20,69,254,230,254,197
5
·250 DATA24,101,21,69,254,170,230,254,164,252,185,0,1724
·260 DATA2,133,253,201,34,208,6,165,2,73,255,133,1465
·270 DATA2,201,32,208,4,165,2,240,8,138,24,101,1125
·280 DATA253,69,254,170,44,198,254,230,252,164,253,208,23
49
·290 DATA213,138,41,240,74,74,74,74,24,105,129,141,1327
·300 DATA44,193,138,41,15,24,105,129,141,45,193,162,1230
·310 DATA0,189,43,193,240,12,157,0,4,173,134,2,1147
·320 DATA157,0,216,232,208,239,169,38,141,2,3,173,1578
·330 DATA48,193,240,23,165,161,201,212,176,4,165,160,1748
·340 DATA240,13,238,32,208,160,0,32,225,255,208,6,1617
·350 DATA32,33,193,76,38,192,232,208,242,200,208,239,1893
·360 DATA32,68,229,169,0,168,174,49,193,32,186,255,1555
·370 DATA173,50,193,162,51,160,193,32,189,255,169,43,1670
·380 DATA166,45,164,46,32,216,255,162,1,189,51,193,1520
·390 DATA168,200,152,201,58,144,2,169,48,157,51,193,1543
·400 DATA201,48,208,3,202,16,234,32,33,193,76,116,1362
·410 DATA164,206,32,208,169,0,170,168,76,219,255,160,1827
·420 DATA1,1,160,0,0,65,72,79,89,33,0,0,500
```

C-128 BUG REPELLENT

```
·10 PRINTCHR$(147)"LOADING AND CHECKING THE DATA[3"."]":J
=4864
·20 FORB=0TO11:READA:IFA<0ORA>255THEN40
·30 POKEJ+B,A:X=X+A:NEXTB:READA:IFA=XTHEN50
·40 PRINT:PRINT"ERROR IN DATA LINE:"PEEK(66)*256+PEEK(65)
:END
·50 X=0:J=J+12:IFJ<5213THEN20
·60 POKE208,0:POKE5213,0:A$="Y":B$=A$:C$="D":D$="DISK":D=
8:PRINTCHR$(147)
·70 INPUT"DO YOU WANT AUTOMATIC SAVES (Y/N)";A$:PRINT:IFA
$="Y"THEN90
·80 PRINT"NO AUTOMATIC SAVES[3"."]":GOTO150
·90 POKE5213,1:INPUT"DISK OR TAPE (D/T)";C$:IFC$<>"D"THEN
D=1:D$="TAPE"
·100 POKE5214,D:D$=D$+" DRIVE":PRINT:INPUT"FILE NUMBER (0
-99)";N
·110 N$=RIGHT$(STR$(N),2):IFN<10THENN$=CHR$(48)+CHR$(N+48
)
·120 F$="BACKUP":PRINT:INPUT"FILENAME";F$:F$=N$+LEFT$(F$,
14):L=LEN(F$)
·130 POKE5215,L:FORJ=1TOL:POKE5215+J,ASC(MID$(F$,J,1)):NE
XTJ:PRINT
·140 PRINT"SAVING DEVICE ** "D$:PRINT"STARTING WITH ** "F
$
·150 PRINT:INPUT"IS THIS CORRECT (Y/N)";B$:IFB$<>"Y"THEN6
0
·160 POKE770,198:POKE771,77:SYS4864:END
·170 DATA32,58,20,169,41,162,19,236,3,3,208,4,955
·180 DATA169,198,162,77,141,2,3,142,3,3,224,19,1143
·190 DATA208,7,32,125,255,79,78,0,96,32,125,255,1292
·200 DATA79,70,70,0,96,162,0,134,251,189,0,2,1053
·210 DATA240,19,201,48,144,9,201,58,176,5,133,251,1485
·220 DATA232,208,238,134,252,165,251,208,3,76,198,77,2042
·230 DATA169,0,166,235,164,236,133,253,133,254,142,47,193
2
·240 DATA20,140,48,20,24,101,22,69,254,230,254,24,1206
·250 DATA101,23,69,254,170,230,254,164,252,185,0,2,1704
·260 DATA133,251,201,34,208,6,165,253,73,255,133,253,1965
·270 DATA201,32,208,4,165,253,240,8,138,24,101,251,1625
·280 DATA69,254,170,44,198,254,230,252,164,251,208,213,23
07
·290 DATA138,41,240,74,74,74,74,24,105,65,141,88,1138
·300 DATA20,138,41,15,24,105,65,141,89,20,32,79,769
·310 DATA20,189,85,20,240,6,32,210,255,232,208,245,1742
·320 DATA174,47,20,172,48,20,24,32,240,255,173,93,1298
·330 DATA20,240,27,165,161,201,212,176,4,165,160,240,1771
·340 DATA17,32,65,20,238,32,208,238,1,214,32,225,1322
·350 DATA255,208,6,32,49,20,76,198,77,232,208,242,1603
·360 DATA200,208,239,32,66,193,173,95,20,162,96,160,1644
·370 DATA20,32,189,255,169,0,170,32,104,255,169,0,1395
·380 DATA174,94,20,168,32,186,255,169,45,174,16,18,1351
·390 DATA172,17,18,32,216,255,162,1,189,96,20,168,1346
·400 DATA200,152,201,58,144,2,169,48,157,96,20,201,1448
·410 DATA48,208,3,202,16,234,32,49,20,141,0,2,955
·420 DATA76,183,77,58,59,32,65,20,206,32,208,206,1222
·430 DATA1,214,169,0,170,168,76,219,255,32,79,20,1403
·440 DATA169,26,141,0,214,173,0,214,16,251,96,162,1462
·450 DATA0,142,0,255,96,19,18,32,32,32,32,146,804
·460 DATA0,1,0,0,65,72,79,89,33,0,0,0,339
```

FLANKSPEED FOR THE C-64 By GORDON F. WHEAT

Flankspeed will allow you to enter machine language *Ahoy!* programs without any mistakes. Once you have typed the program in, save it for future use. While entering an ML program with *Flankspeed* there is no need to enter spaces or hit the carriage return. This is all done automatically. If you make an error in a line a bell will ring and you will be asked to enter it again. To LOAD in a program Saved with *Flankspeed* use LOAD "name",1,1 for tape, or LOAD "name",8,1 for disk. The function keys may be used after the starting and ending addresses have been entered.

f1–SAVEs what you have entered so far.

f3–LOADs in a program worked on previously.

f5–To continue on a line you stopped on after LOADing in the previous saved work.

f7–Scans through the program to locate a particular line, or to find out where you stopped the last time you entered the program. It temporarily freezes the output as well.

```
·100 POKE53280,12:POKE53281,11                          OP
·105 PRINT"[CLEAR][c 8][RVSON][15" "]FLANKSPEED[15" "]";  FP
·110 PRINT"[RVSON][5" "]MISTAKEPROOF ML ENTRY PROGRAM[6" "
 ]"                                                     JP
·115 PRINT"[RVSON][9" "]CREATED BY G. F. WHEAT[9" "]"   FA
·120 PRINT"[RVSON][3" "]COPR. 1987, ION INTERNATIONAL INC.
 [3" "]"                                                AJ
·125 FORA=54272TO54296:POKEA,0:NEXT                     ND
·130 POKE54272,4:POKE54273,48:POKE54277,0:POKE54278,249:PO
 KE54296,15                                             NP
·135 FORA=680TO699:READB:POKEA,B:NEXT                   FL
·140 DATA169,251,166,253,164,254,32,216,255,96          FF
·145 DATA169,0,166,251,164,252,32,213,255,96            EK
·150 B$="STARTING ADDRESS IN HEX":GOSUB430:AD=B:SR=B    KP
·155 GOSUB480:IFB=0THEN150                              OE
·160 POKE251,T(4)+T(3)*16:POKE252,T(2)+T(1)*16          AM
·165 B$="ENDING ADDRESS IN HEX":GOSUB430:EN=B           PE
·170 GOSUB470:IFB=0THEN150                              PG
·175 POKE254,T(2)+T(1)*16:B=T(4)+1+T(3)*16              GM
·180 IFB>255THENB=B-255:POKE254,PEEK(254)+1             HG
·185 POKE253,B:PRINT                                    EC
·190 REM  GET HEX LINE                                  ED
·195 GOSUB495:PRINT": [c P][LEFT]";:FORA=0TO8           KD
·200 FORB=0TO1:GOTO250                                  IH
·205 NEXTB                                              IJ
·210 A%(A)=T(1)+T(0)*16:IFAD+A-1=ENTHEN340              FA
·215 PRINT" [c P][LEFT]";                               EG
·220 NEXTA:T=AD-(INT(AD/256)*256):PRINT" "              II
·225 FORA=0TO7:T=T+A%(A):IFT>255THENT=T-255             GL
·230 NEXT                                               GI
·235 IFA%(8)<>TTHENGOSUB375:GOTO195                     FL
·240 FORA=0TO7:POKEAD+A,A%(A):NEXT:AD=AD+8:GOTO195      IM
·245 REM    GET HEX INPUT                               PA
·250 GETA$:IFA$=""THEN250                               GA
·255 IFA$=CHR$(20)THEN305                               GO
·260 IFA$=CHR$(133)THEN535                              LM
·265 IFA$=CHR$(134)THEN560                              IG
·270 IFA$=CHR$(135)THENPRINT" ":GOTO620                 HO
·275 IFA$=CHR$(136)THENPRINT" ":GOTO635                 HE
·280 IFA$>"@"ANDA$<"G"THENT(B)=ASC(A$)-55:GOTO295       MI
·285 IFA$>"/"ANDA$<":"THENT(B)=ASC(A$)-48:GOTO295       DJ
·290 GOSUB415:GOTO250                                   JA
·295 PRINTA$"[c P][LEFT]";                              PK
·300 GOTO205                                            FA
·305 IFA>0THEN320                                       BI
·310 A=-1:IFB=1THEN330                                  BB
·315 GOTO220                                            FA
·320 IFB=0THENPRINTCHR$(20);CHR$(20);:A=A-1             BF
·325 A=A-1                                              FK
·330 PRINTCHR$(20);:GOTO220                             PH
·335 REM LAST LINE                                      CP
·340 PRINT" ":T=AD-(INT(AD/256)*256)                    KH
·345 FORB=0TOA-1:T=T+A%(B):IFT>255THENT=T-255           OD
·350 NEXT                                               OB
·355 IFA%(A)<>TTHENGOSUB375:GOTO195                     LH
·360 FORB=0TOA-1:POKEAD+B,A%(B):NEXT                    BO
·365 PRINT:PRINT"YOU ARE FINISHED!":GOTO535             MB
·370 REM BELL AND ERROR MESSAGES                        LM
·375 PRINT:PRINT"LINE ENTERED INCORRECTLY":PRINT:GOTO415  JK
·380 PRINT:PRINT"INPUT A 4 DIGIT HEX VALUE!":GOTO415    PG
·385 PRINT:PRINT"ENDING IS LESS THAN STARTING!":B=0:GOTO41
 5                                                      IK
·390 PRINT:PRINT"ADDRESS NOT WITHIN SPECIFIED RANGE!":B=0:
 GOTO415                                                HK
·395 PRINT:PRINT"NOT ZERO PAGE OR ROM!":B=0:GOTO415     DM
·400 PRINT"?ERROR IN SAVE":GOTO415                      JK
·405 PRINT"?ERROR IN LOAD":GOTO415                      IO
·410 PRINT:PRINT:PRINT"END OF ML AREA":PRINT            JO
·415 POKE54276,17:POKE54276,16:RETURN                   BF
·420 OPEN15,8,15:INPUT#15,A,A$:CLOSE15:PRINTA$:RETURN   DH
·425 REM GET FOUR DIGIT HEX                             IM
·430 PRINT:PRINTB$;:INPUTT$                             OL
·435 IFLEN(T$)<>4THENGOSUB380:GOTO430                   JD
·440 FORA=1TO4:A$=MID$(T$,A,1):GOSUB450:IFT(A)=16THENGOSUB
 380:GOTO430                                            AK
·445 NEXT:B=(T(1)*4096)+(T(2)*256)+(T(3)*16)+T(4):RETURN  KB
·450 IFA$>"@"ANDA$<"G"THENT(A)=ASC(A$)-55:RETURN        GM
·455 IFA$>"/"ANDA$<":"THENT(A)=ASC(A$)-48:RETURN        NJ
·460 T(A)=16:RETURN                                     IC
·465 REM ADDRESS CHECK                                  OL
·470 IFAD>ENTHEN385                                     HO
·475 IFB<SRORB>ENTHEN390                                LE
·480 IFB<256OR(B>40960ANDB<49152)ORB>53247THEN395       OB
·485 RETURN                                             HE
·490 REM ADDRESS TO HEX                                 PM
·495 AC=AD:A=4096:GOSUB520                              AP
·500 A=256:GOSUB520                                     NF
·505 A=16:GOSUB520                                      LG
·510 A=1:GOSUB520                                       HE
·515 RETURN                                             JD
·520 T=INT(AC/A):IFT>9THENA$=CHR$(T+55):GOTO530         OC
·525 A$=CHR$(T+48)                                      JI
·530 PRINTA$;:AC=AC-A*T:RETURN                          AA
·535 A$="**SAVE**":GOSUB585                             IC
·540 OPEN1,T,1,A$:SYS680:CLOSE1                         AB
·545 IFST=0THENEND                                      FB
·550 GOSUB400:IFT=8THENGOSUB420                         PM
·555 GOTO535                                            FI
·560 A$="**LOAD**":GOSUB585                             PE
·565 OPEN1,T,0,A$:SYS690:CLOSE1                         PO
·570 IFST=64THEN195                                     OI
·575 GOSUB405:IFT=8THENGOSUB420                         CO
·580 GOTO560                                            GN
·585 PRINT" ":PRINTTAB(14)A$                            KA
·590 PRINT:A$="":INPUT"FILENAME";A$                     IO
·595 IFA$=""THEN590                                     HK
·600 PRINT:PRINT"TAPE OR DISK?":PRINT                   HL
·605 GETB$:T=1:IFB$="D"THENT=8:A$="@0:"+A$:RETURN       NP
·610 IFB$<>"T"THEN605                                   KO
·615 RETURN                                             PH
·620 B$="CONTINUE FROM ADDRESS":GOSUB430:AD=B           DD
·625 GOSUB475:IFB=0THEN620                              NK
·630 PRINT:GOTO195                                      HN
·635 B$="BEGIN SCAN AT ADDRESS":GOSUB430:AD=B           FK
·640 GOSUB475:IFB=0THEN635                              LN
·645 PRINT:GOTO670                                      HI
·650 FORB=0TO7:AC=PEEK(AD+B):GOSUB505:IFAD+B=ENTHENAD=SR:G
 OSUB410:GOTO195                                        LM
·655 PRINT" ";:NEXTB                                    LE
·660 PRINT:AD=AD+8                                      CD
·665 GETB$:IFB$=CHR$(136)THEN195                        JD
·670 GOSUB495:PRINT": ";:GOTO650                        KE
```

IMPORTANT! Letters on white background are **Bug Repellent** line codes. **Do not enter them!** Pages 81 and 82 explain these codes and provide other essential information on entering ***Ahoy!*** programs. Refer to these pages **before** entering any programs!

GALACTIC CAB CO.
FROM PAGE 63

```
·10 FAST:DIM D(15),A,J,W,U,S,H,V,X,Y,N,R,
 P,G,Z,D,I,T,C,Q,B,D$(6),L,BO(7),SC(7),SC FA
·20 FORX=.TO15:READD(X):NEXT:H$="##.#":S$
 ="[6"#"]":F$="[3"#"]":PUDEF"0":FORX=.TO4
 :READD$(X):NEXT:D$(5)=D$(4):D$(6)=D$(5):
 GOSUB280:FORX=1TO7:BO(X)=2[UPARROW]X:REA
 DSC(X):NEXT                              DA
·30 DEFFNJ(X)=(JAND15)+((JAND15)=.)*-1:DE
 FFNH(X)=H+D((A-1)*2):DEFFNV(X)=V+D((A-1)
 *2+1):DEFFNK(X)=((A>.ANDA<4)ORA>6):DEFFN
 R(X)=(RND(W)*7)+W:DEFFNL(X)=R+(R=.)*-W   JA
·40 DEFFND(X)=(R>P)*-T:GOSUB310:VOL.:POKE
 54272,19:POKE54273,10:POKE54277,255:POKE
 54278,255:POKE54276,129:X=3584:READA:DO:
 POKEX,A:READA:X=X+1:LOOPUNTILA=-1        OE
·50 SPRITE1,1,13,,,,1:MOVSPR1,.#.:MOVSPR1
 ,205,125:POKE2040,56                     EA
·60 X=205:Y=125:F=500:R=.:W=1:C=.5:H=.:V=
 .:B=2040:G=.06:Q=128:U=2:I=15:N=24:P=3:S
 LOW                                      PF
·70 A=BUMP(1):A=BUMP(1):A=BUMP(2):A=BUMP(
 2):COLLISION1,180                        GO
·80 REM MAIN LOOP                         DG
·90 DO:J=JOY(U):A=FNJ(.):IFJ>=QANDFNK(.)A
 NDFTHENH=FNH(.):V=FNV(.):R=FNL(.):VOLI:P
 OKEB,57:F=F-W:ELSEVOL.                   ED
·100 X=X+H:Y=Y+V:MOVSPRW,X,Y:POKEB,56:IFR
 THENV=V+G:A=FNR(.):Z=Z=.:POKEB+A,59+Z    IG
·110 PRINT"[HOME][DOWN][c 4][RIGHT]"SPC(I
 );D$(FND(.)):CHAR.,.,N:PRINT"[RVSON][RED
 ][5"[RIGHT]"]";:PRINTUSINGF$;F;:PRINT"[R
 IGHT][RIGHT]";:PRINTUSINGH$;V;:PRINT"[RI
 GHT]";:PRINTUSINGH$;H:T=T+C:IFT=.ORT=6TH
 ENC=-C                                   HN
·120 A=BUMP(U):LOOPUNTILRSPPOS(W,W)<NORA:
 VOL.:COLLISIONW                          EO
·130 IFATHENBEGIN:VOL15:SOUND2,5000,99,U,
 W,50,3:FORX=WTO8:POKE2039+X,60:MOVSPRX,R
 SPPOS(W,.),RSPPOS(W,W):SPRITEX,W,U:MOVSP
 RX,((X-W)*45)#U                          PK
·140 NEXT:SLEEP1:POKE53248+21,.:VOL.:GOSU
 B560:CHAR.,.,N:FAST:GOSUB550:GOSUB280:SC
 =.:GOTO50:BEND                           ON
·150 PRINT"[RED][RVSON]";:FORX=WTOR-W:SC=
 SC+1000:CHAR.,34,N:PRINTUSINGS$;SC;:VOL1
 5:SOUND3,5000,10,.,,,,.:FORY=.TO90:NEXT:V
 OL.:NEXT                                 CK
·160 GOSUB580:SLEEP8:CHAR.,.,N:FAST:GOSUB
 550:CHAR.,34,N:PRINT"[RED][RVSON]";:PRIN
 TUSINGS$;SC:GOSUB280:GOTO50              OM
·170 REM COLLISION ROUTINE                BH
·180 S=BUMP(W):FORL=WTO7:IF(SANDBO(L))THE
 NBEGIN:SPRITEL+W,.:G=G+.015:R=R+W:SC=SC+
 SC(L):CHAR.,34,N:PRINT"[RED][RVSON]";:PR
 INTUSINGS$;SC;:VOL15:SOUND3,10000,20,1,,
 9000,2                                   AH
·190 CHAR.,N,N:PRINTR-W:BEND              CA
·200 NEXT:S=BUMP(W):S=BUMP(W):RETURN      BH
·210 REM DELTA ADJUSTMENTS                DF
·220 DATA .,-.2,.2,-.2,.2,-.2,,,,,,,-.2,-
 .2,-.2,-.2                               CI
·230 REM DOORS                            PA
·240 DATA "[7"[c Y]"]","[3"[c Y]"] [3"[c
 Y]"]","[c Y][c Y][3" "][c Y][c Y]","[c Y
 ][5" "][c Y]","[7" "]"                   DM
·250 REM SPRITE LOCATION DATA             PK
·260 DATA 64,101,73,157,128,197,207,165,2
 64,205,303,117,294,77                    IH
·270 REM SET UP SPRITES                   DL
·280 RESTORE260:SPRCOLOR12,3:FORX=2TO8:RE
 ADH,V:MOVSPRX,.#.:MOVSPRX,H,V:POKE2039+X
 ,58:SPRITEX,1,7,,,,1:NEXT:RETURN         ND
·290 REM SCORE VALUES                     PN
·300 DATA 300,200,100,500,600,800,1000    HM
·310 COLOR.,1:COLOR4,1:PRINTCHR$(27)"M";"
 [CLEAR][c 5][RVSON][15"[s C]"][c *][RVSO
 FF]"SPC(7)"[RVSON][sEP][16"[s C]"]";     ME
·320 PRINT"[15"[s C]"][RVSOFF][sEP]"SPC(7
 )"[c *][RVSON][16"[s C]"]";              OP
·330 PRINT"[c A][3"[c R]"][c S]  [RVSOFF]
 [sEP]"SPC(17)"[RVSON]:[RVSOFF]"SPC(6)"[c
 *][sEP][c *][sEP][c *][sEP][c *][RVSON]
 ";                                       GE
·340 PRINT"[c Z][3"[c E]"][c X][RVSOFF][s
 EP]"SPC(19)"[RVSON]:[RVSOFF]"SPC(13)"[RV
 SON] ";                                  DC
·350 PRINT"[3"[c D]"] [RVSOFF][sEP]"SPC(2
 0)"[RVSON]:[RVSOFF]"SPC(13)"[RVSON] ";   AH
·360 PRINT"[3"[c D]"] [c *][RVSOFF]"SPC(2
 0)"[RVSON]:[RVSOFF]"SPC(12)"[RVSON][sEP]
 ";                                       IB
·370 PRINT"[4"[s W]"][RVSOFF][sEP]"SPC(20
 )"[RVSON]:[RVSOFF]"SPC(6)"[RVSON][sEP]1[
 3"0"][3" "]";                            FA
·380 PRINT"[4"[s W]"][RVSOFF]"SPC(21)"[c
 *][RVSON][c *][RVSOFF]"SPC(11)"[c *][RVS
 ON] ";                                   DK
·390 PRINT"[4"[s W]"][RVSOFF]"SPC(22)"[c
 *][RVSON][c *][RVSOFF]"SPC(11)"[RVSON] "
 ;                                        MA
·400 PRINT"[4"[s W]"] 300[RVSOFF][sEP]"SP
 C(18)"[RVSON]P[RVSOFF]"SPC(11)"[RVSON] "
 ;                                        NL
·410 PRINT"[4"[s W]"][s C][c R][s C][RVSO
 FF]"SPC(20)"[RVSON]A[RVSOFF]"SPC(11)"[RV
 SON] ";                                         LI
·420 PRINT"[4"[s W]"][s C][c X][RVSOFF][s
 EP]"SPC(20)"[RVSON]D[RVSOFF]"SPC(6)"[c *
 ][RVSON]800  ";                                 IH
·430 PRINT"[4":"][c *][RVSOFF]"SPC(17)"[R
 VSON][5"[s +]"][c W][RVSOFF]"SPC(7)"[RVS
 ON]:[c A][c S]: ";                              KI
·440 PRINT"[4":"] [RVSOFF][sEP]"SPC(28)"[
 RVSON][sEP]:[c Z][c X]: ";                      NJ
·450 PRINT"[4":"][c *][RVSOFF]"SPC(29)"[c
  *][RVSON][4":"] ";                             LK
·460 PRINT"[4":"] [c *][RVSOFF]"SPC(29)"[
 c *][RVSON][3":"] ";                            MI
·470 PRINT":[c A][c S][c A][c S] 200 [c *
 ][RVSOFF]"SPC(24)"[RVSON][sEP][3":"] ";         AP
·480 PRINT":[c Z][c X][c Z][c X] [4"[c T]
 "][RVSOFF][sEP]"SPC(10)"[c *][RVSON] 500
  [RVSOFF][sEP]"SPC(7)"[c *][RVSON][3":"]
  ";                                             GC
·490 PRINT":[c A][c S][c A][c S][c A][c S
 ][c T][c T][RVSOFF][sEP]"SPC(12)"[c *][R
 VSON][3"[c R]"][RVSOFF][sEP]"SPC(9)"[RVS
 ON][3":"] ";                                    BI
·500 PRINT":[c Z][c X][c Z][c X][c Z][c X
 ] [RVSOFF][sEP]"SPC(14)"[RVSON][3"[s B]"
 ][RVSOFF]"SPC(10)"[RVSON][3":"] ";              IN
·510 PRINT"[c A][c S][s O][s P] [s O][s P
 ] [c *][RVSOFF]"SPC(14)"[RVSON][3"[s B]"
 ][RVSOFF]"SPC(9)"[RVSON][sEP][3":"] ";          CG
·520 PRINT"[c Z][c X][s L][s @] [s L][s @
 ][s C][c S] [c *][RVSOFF] [RVSON][sEP]10
 0[c *][RVSOFF][3" "][RVSON][sEP][c *][sE
 P][3"[s B]"][RVSOFF]  [RVSON][sEP][c *][
 RVSOFF][3" "][RVSON][c *][sEP][4":"] ";         HH
·530 PRINT"[8"[c R]"][c X][4"[s C]"][4" "
 ][c *][RVSOFF] [RVSON][sEP][s N][s M][4"
 [c T]"][c *][sEP]::600[6":"] ";                 II
·540 PRINT"[c 7][12" "]GALACTIC CAB CO.[1
 2" "]";                                         CG
·550 PRINT"[RVSON][YELLOW]FUEL[RED][5" "]
 [YELLOW]V[RED][4" "][YELLOW]H[RED][4" "]
 [YELLOW]FARES[RED][4" "][YELLOW]CASH$[RE
 D] [6"0"]":RETURN                               FA
·560 GOSUB590:CHAR.,.,N:PRINTCHR$(27)"Q";
 TAB(11)"[c 7]ANOTHER GAME?(Y/N)":DO:GETA
 $:LOOPUNTILA$="":DO:GETKEYA$:LOOPUNTILA$
 ="Y"ORA$="N":IFA$="Y"THENRETURN                 MF
·570 COLOR.,12:COLOR4,14:PRINT"[CLEAR][c
 6]"CHR$(27)"L":END                              OJ
·580 GOSUB590:CHAR.,.,N:PRINTCHR$(27)"Q";
 TAB(11)"[RVSOFF][c 7]SUCCESSFUL RUN [3"!
 "]":RETURN                                      LP
·590 CHAR.,.,N:PRINTCHR$(27)"Q";TAB(5)"[c
  5]YOU HAVE MADE [c 8]$";:PRINTUSINGS$;S
 C;:PRINT"[c 5] IN CASH.":SLEEP5:RETURN          AL
·600 DATA000,,,,,,,.                             NG
·610 DATA000,,,,,,,.                             NE
·620 DATA000,,,,,,085,.                          HB
·630 DATA002,170,128,006,105,144,042,170         HM
·640 DATA168,038,105,152,038,105,152,042         EL
·650 DATA170,168,005,085,080,085,065,085         HE
·660 DATA085,,085,021,,084,005,.                 BC
·670 DATA080,001,,064,,,,.                       BC
·680 DATA000,,,,,,,.                             CG
·690 DATA000,,,,,,,.                             CE
·700 DATA000,,,,,,085,.                          MB
·710 DATA002,170,128,006,105,144,042,170         EM
·720 DATA168,038,105,152,038,105,152,042         FL
·730 DATA170,168,005,085,080,085,065,085         ME
·740 DATA085,,085,213,,087,245,.                 IA
·750 DATA095,253,,127,252,,015,.                 IN
·760 DATA000,,,,,,,.                             HG
·770 DATA000,,,,,,,.                             IP
·780 DATA000,,,,,,,.                             GN
·790 DATA000,,,,,,001,.                          PO
·800 DATA000,001,016,,001,016,,.                 ML
·810 DATA084,,,017,,,017,.                       LA
·820 DATA000,016,,,068,,,068                     BI
·830 DATA000,,068,,170,170,170,.                 BH
·840 DATA000,,,,,,,.                             MB
·850 DATA000,,,,,,,.                             NP
·860 DATA000,,,,,,,.                             LN
·870 DATA000,,,,,,,.                             NL
·880 DATA000,004,016,,001,016,,.                 JE
·890 DATA084,,,017,,,017,.                       GA
·900 DATA000,016,,,068,,,068                     AI
·910 DATA000,,068,,170,170,170,.                 IH
·920 DATA008,,008,,131,,,.                       DP
·930 DATA000,140,002,008,,016,,001               KB
·940 DATA000,067,,,032,018,004,.                 BO
·950 DATA000,,016,001,017,002,192,.              AP
·960 DATA000,004,004,016,,064,003,.              EB
·970 DATA001,,140,,008,,016,.                    CL
·980 DATA050,,131,,,,,140                        GB
·990 DATA000,032,,032,003,008,,,-1               KP
```

MEGAFLOPS AND MICROSECONDS

FROM PAGE 20

JIFFIES

```
·1 REM=================================== NM
·2 REM            JIFFIES                 IG
·3 REM        RUPERT REPORT #42           MC
·4 REM          FOR C128/C64              BJ
·5 REM    DISPLAY STATE OF JOYSTICK #2    LB
·6 REM    BUTTON & SHOW TIMES             IM
·9 REM=================================== CE
·10 J2=56320 : P0=111 : P1=127            OM
·20 IF PEEK(J2)=P1 THEN 20 :REM WAIT TILL
  BUTTON IS PRESSED                       KL
·30 T0=TI                :REM START TIMER OD
·40 PRINT"0"; : IF PEEK(J2)=P0 THEN 40    NJ
·50 TM=TI-T0 : PRINT     :REM STOP TIMER  MM
```

```
•60 PRINT TM;"JIFFIES (";TM/60;"SECONDS)" CG
•70 GOTO 20              :REM REPEAT      KG
•80 REM ---------------------------------- MI
•90 REM:ADD LINE 25 GOTO 100 TO COME HERE
---------------------------------------- IL
•100 PRINT"0"; : IF PEEK(J2)=P0 THEN 100  MF
•110 PRINT"1"; : IF PEEK(J2)=P1 THEN 110  DK
•120 GOTO 100                             JF
```

BOUNCE.MON

```
 1 REM  ==================================
 2 REM             BOUNCE.MON
 3 REM         RUPERT REPORT #42
 4 REM   COMMENTED MONITOR LISTING OF
 5 REM        SWITCH BOUNCE PROGRAM
 6 REM   [# CYCLES AT END OF EACH LINE]
 7 REM  ==================================
10 :PUT VIC SCREEN STARTING ADDRESS
12 :($0400) INTO $FB AND $FC
14 . 013D0  A9 00     LDA #$00          [2]
16 . 013D2  85 FB     STA $FB           [3]
18 . 013D4  A9 04     LDA #$04          [2]
20 . 013D6  85 FC     STA $FC           [3]
22 :SCREEN OFFSET POINTER IN Y
24 . 013D8  A0 00     LDY #$00          [2]
26 :MSB OF MAX SCREEN ADDRESS IN X
28 . 013DA  A2 07     LDX #$07          [2]
30 :BIT 4 OF $DC00 IS SWITCH VALUE
32 . 013DC  A9 10     LDA #$10          [2]
34 :LOOP WHILE SWITCH IS NOT PRESSED
36 . 013DE  2C 00 DC BIT $DC00          [4]
38 . 013E1  D0 FB     BNE $13DE       [2/3]
40 :<<MAIN LOOP>> - READ SWITCH; BIT 4
42 :=0 WHEN PRESSED, =1 WHEN RELEASED.
44 :PUT "0" OR "1" INTO A-REG.
46 . 013E3  A9 10     LDA #$10          [2]
48 . 013E5  2C 00 DC BIT $DC00          [4]
50 . 013E8  F0 04     BEQ $13EE ;=0 [2/3]
52 . 013EA  A9 31     LDA #$31   ;"1"   [2]
54 . 013EC  D0 02     BNE $13F0         [2]
56 . 013EE  A9 30     LDA #$30   ;"0"   [2]
58 :DISPLAY 0 OR 1 ON SCREEN.
60 : 013F0  91 FB     STA ($FB),Y       [6]
62 :INCREMENT Y SCREEN POINTER.
64 :WHEN Y REACHES 0, INCREMENT $FC.
66 . 013F2  C8        INY               [2]
68 . 013F3  D0 EE     BNE $13E3       [2/3]
70 . 013F5  E6 FC     INC $FC           [5]
72 :X-REG=7; DONE WHEN $FC=7;
74 :OTHERWISE, GO BACK FOR MORE.
76 . 013F7  E4 FC     CPX $FC           [2]
78 . 013F9  D0 E8     BNE $13E3       [2/3]
80 . 013FB  60        RTS   ;TO BASIC   [6]
```

SWITCH BOUNCE

```
•100 REM==================================== DE
•110 REM          SWITCH BOUNCE             IH
•120 REM         RUPERT REPORT #42          DJ
•130 REM           FOR C128/C64             MD
•140 REM  USE 40-COLUMN DISPLAY             EI
•150 REM  PLUG JOYSTICK INTO PORT 2         AC
•160 REM  PRESS JOYSTICK BUTTON AND SEE     EE
•170 REM   A DISPLAY OF SWITCH BOUNCE.      LG
•180 REM  TO EXIT, HOLD RUN/STOP THEN       MJ
•190 REM   PRESS JOYSTICK BUTTON            PP
•200 REM==================================== BA
•210 PRINT"[CLEAR]"                         EH
•220 M=5072                                 KN
•230 READ B$                                NA
•240 IF B$="XX" THEN 340                    MM
•250 REM ---------------------------------- ML
•260 REM    FOR C64 CHANGE LINE 290         HE
•270 REM      TO    GOSUB 500               EP
•280 REM ---------------------------------- OG
•290 B=DEC(B$)   :REM < GOSUB 500 FOR C64   OC
•300 CK=CK+B     :REM CHECKSUM              BP
•310 POKE M,B                               JC
•320 M=M+1                                  GA
•330 GOTO 230                               GE
•340 IF CK<>6226 THEN PRINT"DATA ERROR" :
 STOP                                       EG
•350 PRINT"USE 40-COLUMN SCREEN.  ";        OG
•360 PRINT"PUT JOYSTICK INTO PORT 2. ";     BH
•370 FOR L=3 TO 20 : PRINT : NEXT           MP
•380 PRINT"PRESS JOYSTICK BUTTON"           OM
•390 SYS 5072                               PJ
•400 FOR N=1 TO 38 :PRINT" ";:NEXT :PRINT
 "[UP]"                                     BF
•410 PRINT"OR HOLD RUN/STOP & PRESS BUTTO
 N TO EXIT[UP]"                             GK
•420 GOTO 390                               MN
•430 END                                    CP
•500 REM --LINES 500-600 FOR C64 ONLY---- EB
•510 REM       CONVERT HEX TO DECIMAL       GH
•520 MS$=LEFT$(B$,1)                        FH
•530 LS$=RIGHT$(B$,1)                       EN
•540 MS=VAL(MS$)                            DK
•550 IF MS$>="A" THEN MS=ASC(MS$)-55        GO
•560 LS=VAL(LS$)                            FM
•570 IF LS$>="A" THEN LS=ASC(LS$)-55        GN
•580 B=MS*16+LS                             DO
•590 RETURN                                 NO
•600 REM ---------------------------------- KL
•5072 DATA A9, 00, 85, FB, A9, 04, 85, FC AE
•5080 DATA A0, 00, A2, 07, A9, 10, 2C, 00 OE
•5088 DATA DC, D0, FB, A9, 10, 2C, 00, DC EJ
•5096 DATA F0, 04, A9, 31, D0, 02, A9, 30 LM
•5104 DATA 91, FB, C8, D0, EE, E6, FC, E4 HH
```

```
•5112 DATA FC, D0, E8, 60                    ND
•5116 DATA XX                                EB
```

WRAITHS

FROM PAGE 18

```
•10 COLOR.,1:COLOR4,1:COLOR1,7:GRAPHIC2,1
,.:PRINTCHR$(11)CHR$(142);                   AM
•20 PRINT"[CLEAR][DOWN][DOWN][4"[RIGHT]"]
[c 3][s U][30"[s C]"][s I]"                  OB
•30 PRINTTAB(4)"[s B][RED][c T][c *][RVSO
N][c *][RVSOFF][3" "][c U][RVSON] [RVSOF
F] [RVSON] [c I][c *][sEP]  [c *][RVSOFF
][c C][RVSON] [RVSOFF][c V][c U][RVSON]
[RVSOFF][c U][RVSON][c H][RVSOFF] [RVSON
] [c H][3"[c I]"][c F][c 3][RVSOFF][s B]
"                                            DA
•40 PRINTTAB(4)"[s B]  [RED][c *][RVSON][
c *][RVSOFF][3" "][RVSON] [RVSOFF] [RVSO
N]  [RVSOFF][sEP][RVSON] [RVSOFF][c O][c
 O][RVSON] [RVSOFF] [RVSON] [RVSOFF]  [R
VSON] [RVSOFF] [RVSON][c H]  [RVSOFF][c
*][RVSON]  [c *][RVSOFF] [c 3][s B]"         FC
•50 PRINTTAB(4)"[s B][3" "][RED][c *][RVS
ON][c *][sEP][c *] [RVSOFF] [RVSON] [RVS
OFF][c *][RVSON][c *] [RVSOFF]  [RVSON]
[RVSOFF] [RVSON] [RVSOFF]  [RVSON] [RVSO
FF] [RVSON][c H][RVSOFF] [RVSON] [RVSOFF
][3" "][RVSON] [RVSOFF] [c 3][s B]"          BH
•60 PRINTTAB(4)"[s B][c 8][C] [RED][c *][
sEP][c *][sEP][c P][RVSON] [RVSOFF] [c *
][RVSON][s M][RVSOFF] [c P][RVSON] [RVSO
FF][c D][RVSON] [RVSOFF][c F][c D][RVSON
] [RVSOFF] [RVSON][c H][RVSOFF][c D][RVS
ON] [c J][c U][c U][RVSOFF][sEP] [c 3][s
 B]"                                         IJ
•70 PRINTTAB(4)"[c Q][30"[s C]"][c W]"       JD
•80 PRINTTAB(4)"[s B][c 1]BY CLEVELAND M.
 BLAKEMORE 1987[c 3][s B]"                   PK
•90 PRINTTAB(4)"[c Q][30"[s C]"][c W]"       DH
•100 PRINTTAB(4)"[s B][YELLOW][RVSON][4"
"]FOR THE C128 COMPUTER[5" "][c 3][RVSOF
F][s B]"                                     NI
•110 PRINTTAB(4)"[s J][30"[s C]"][s K]"      BE
•120 PRINTTAB(13)"[DOWN][DOWN][RED](PLEAS
E WAIT!)":PRINTTAB(8)"[6"[DOWN]"][c 3][4
"-"] LOADING SPRITES [4"-"]"                 GA
•130 A=4864:B=6080:FORC=ATOB:READD:POKEC,
D:NEXT:A=3072:B=3124:FORC=ATOB:READD:POK
EC,D:NEXT:PRINT"[UP]"CHR$(27)"Q"TAB(8)"C
REATING THE WRAITH WORLD ":SLEEP4            DA
•140 A=2:B=360:FORC=.TOBSTEPA:DRAW1,160,1
00TOB;C:NEXT                                 LJ
•150 FORC=.TOB:DRAW.,160,100TO25;C:NEXT:C
OLOR1,16:CHAR1,.,.,CHR$(14)+" [s S]CORE:
[8" "][s L]EVEL: 1[3" "][s S]HIPS  [s @]
 [s @] [s @]  ":GRAPHIC1,.                   PL
```

```
•160 REM INITIALIZE VARIABLES                HL
•170 CLR:DIM J,A,R,P,S,I,O,T,H,X,B(7),N,L
,K,SC:P=8184:L=1:K=3:O=1:T=2:H=3:I=.005:
X=8:N=53269:SC=.:FORJ=.TO7:B(J)=2[UPARRO
W]J:NEXT                                     PC
•180 DEFFNA(X)=JAND15:DEFFNR(J)=R+(A<5)*-
O+(A>5)*O+(R=XANDA<5)*X+(R=OAND(A>5))*-X
:DEFFNS(J)=76+R:DEFFND(J)=(R-O)*45:DEFFN
W(J)=(RND(O)*6)+H                            OB
•190 DEFFNM(J)=(RND(O)*X)*45:DEFFNC(J)=(J
ANDH):DEFFNX(J)=RSPPOS(O,.):DEFFNY(J)=RS
PPOS(O,O):DEFFNB(L)=(B(A-O)ANDL)             HC
•200 SPRITE1,.,15,.,.,.,.,.:MOVSPR1,.#.:MOV
SPR1,173,140:POKE8184,77:R=1:SPRITE2,.,8
:POKE8185,76                                 NF
•210 FORJ=3TO8:MOVSPRJ,.#.:SPRITEJ,.,2:MO
VSPRJ,173,140:MOVSPRJ,120;(J-1)*45:POKE8
183+J,85:NEXT                                FH
•220 S=(L<=3)*-1+(L>3ANDL<=5)*-2+(L>5)*-3
:FORA=.TO10:J=BUMP(1):NEXT:POKE53248+21,
253:SYS3072                                  FL
•230 REM MAIN LOOP                           OE
•240 DO:J=JOY(T):A=FNA(.):IFAANDA=JTHENR=
FNR(.):POKEP,FNS(.):SOUNDO,P,O:ELSEIFA=R
ANDA<>JTHENMOVSPRO,FND(.)#O                  PL
•250 IFA<>RANDA<>JTHENSPRITET,.:MOVSPRT,.
#.:MOVSPRT,FNX(.),FNY(.):MOVSPRT,20;FND(
.):MOVSPRT,FND(.)#X:SPRITET,O:SOUNDO,999
9,20,O,,500,H                                KM
•260 MOVSPRFNW(.),FNM(.)#S:S=S+I:J=BUMP(O
):LOOPUNTILFNC(J):ONFNC(J)GOTO300,270,24
0                                            NK
•270 FORA=HTOX:IFFNB(J)THENSPRITET,.:SOUN
DH,10000,75,.,3000,900,T:GOSUB350            CI
•280 NEXT:J=BUMP(O):J=BUMP(O):IFPEEK(N)>H
THEN240:ELSEPOKEN,.:GRAPHIC.:PRINT"[HOME
][12"[DOWN]"]"CHR$(27)"@"TAB(11)"[4"[DOW
N]"]WRAITHS ANNIHILATED!":L=L+1              OA
•290 PRINTTAB(11)"[DOWN][DOWN]PREPARE FOR
 LEVEL"L;"[LEFT]!":SLEEP4:GRAPHIC1,.:SC$
=STR$(L):CHAR1,21,.,SC$:GOTO200              HK
•300 MOVSPRO,.#.:K=K-O:CHAR.,33+K*2,.," "
:SOUNDT,5000,150,T,,100,3:FORJ=1TO16:SPR
ITEO,O,J:FORA=.TO20:NEXT:POKEP,93:FORA=.
TO20:NEXT:POKEP,94:NEXT:POKE53248+21,.       KD
•310 IFKTHEN200:ELSEFORJ=.TO400:GRAPHICH,
.:SOUNDT,J*50,O,O,J,J*5,T:GRAPHICO,.:FOR
A=.TO10:NEXT:NEXT:GRAPHIC.                   JE
•320 PRINT"[HOME][14"[DOWN]"]"CHR$(27)"@"
TAB(9)"WRAITHS INVADE SECTOR!":SLEEP4:DO
:GETSC$:LOOPUNTILSC$=""                      DA
•330 PRINTTAB(11)"[DOWN][DOWN]ANOTHER GAM
E?(Y/N)":GETKEYSC$:IFSC$="Y"THENGRAPHIC1
,.:CHAR1,8,.,"[5" "]":CHAR1,22,.,"1":CHA
R1,33,.,CHR$(14)+"[s @] [s @] [s @]":RUN
170                                          OK
•340 PRINT"[c 6]"CHR$(147)CHR$(12):COLOR.
,12:COLOR4,14:END                            HK
```

```
·350 SC=SC+L*100:SC$=STR$(SC):CHAR0,8+(5-
 LEN(SC$)),.,SC$:FORH=0TO5:FORT=0TO16:SPR
 ITEA,0,T:NEXT:NEXT:T=2:H=3:SPRITEA,.:RET
 URN                                       FN
·360 DATA0,,,,,,,.                         GE
·370 DATA0,,,,,,,.                         KG
·380 DATA0,,,,,,,.                         JA
·390 DATA0,,,,8,,,28                       AB
·400 DATA0,,8,,,,,.                        NN
·410 DATA0,,,,,,,.                         LO
·420 DATA0,,,,,,,.                         MI
·430 DATA0,,,,,,,.                         LK
·440 DATA0,24,,,24,,,24                    MF
·450 DATA0,,24,,,24,,.                     LK
·460 DATA060,,,126,,,255,.                 HD
·470 DATA001,255,128,,24,,,24              NC
·480 DATA0,,60,,,126,,.                    MA
·490 DATA255,,1,255,128,3,255,192          GH
·500 DATA007,255,224,7,255,224,7,24        KK
·510 DATA224,,24,,,60,,.                   FB
·520 DATA0,,,,,8,,.                        FI
·530 DATA028,,,56,,,112,.                  FE
·540 DATA063,224,,31,192,,15,192           KJ
·550 DATA0,7,192,15,255,192,31,253         CK
·560 DATA192,63,252,192,15,252,,7          PH
·570 DATA252,,3,252,,3,252,.               GF
·580 DATA015,252,,6,60,,2,28               LF
·590 DATA0,,24,,,,,.                       MC
·600 DATA0,,,,,,,.                         HB
·610 DATA0,,,,14,,,15                      PG
·620 DATA0,,15,130,,7,195,.                IC
·630 DATA007,227,128,39,243,192,63,255     OO
·640 DATA255,63,255,255,39,243,192,7       HD
·650 DATA227,128,7,195,,15,130,.           AE
·660 DATA015,,,14,,,,.                     HE
·670 DATA0,,,,,,,.                         NH
·680 DATA0,,,,,,,24                        PE
·690 DATA0,2,28,,6,60,,15                  FF
·700 DATA252,,3,252,,3,252,.               AD
·710 DATA007,252,,15,252,,63,252           AN
·720 DATA192,31,253,192,15,255,192,.       MK
·730 DATA007,192,,15,192,,31,192           PP
·740 DATA0,63,224,,,112,,.                 EI
·750 DATA056,,,28,,,8,.                    PN
·760 DATA0,60,,,24,,7,24                   FB
·770 DATA224,7,255,224,7,255,224,3         EL
·780 DATA255,192,1,255,128,,255,.          IA
·790 DATA0,126,,,60,,,24                   JA
·800 DATA0,,24,,1,255,128,.                AB
·810 DATA255,,,126,,,60,.                  OH
·820 DATA0,24,,,24,,,24                    EL
·830 DATA0,,24,,,24,,249                   IK
·840 DATA0,,,,24,,,56                      PJ
·850 DATA064,,60,96,,63,240,.              LI
·860 DATA063,192,,63,192,,63,224           NM
·870 DATA0,63,240,3,63,252,3,191           CP
·880 DATA248,3,255,240,3,224,,3            HG
·890 DATA240,,3,248,,7,252,.               LM
```

```
·900 DATA014,,,28,,,56,.                   NN
·910 DATA0,16,,,,,,.                       AE
·920 DATA0,,,,,,,.                         LO
·930 DATA0,,,,,,112,.                      HE
·940 DATA0,240,,65,240,,195,224            DJ
·950 DATA001,199,224,3,207,228,127,255     DI
·960 DATA252,127,255,252,3,207,228,1       GI
·970 DATA199,224,,195,224,,65,240          LH
·980 DATA0,,240,,,112,,.                   CH
·990 DATA0,,,,,,,.                         OM
·1000 DATA0,,,16,,,56,.                    OK
·1010 DATA0,28,,,14,,,7                    OM
·1020 DATA252,,3,248,,3,240,.              DE
·1030 DATA003,224,,3,255,240,3,191         KD
·1040 DATA248,3,63,252,,63,240,.           NO
·1050 DATA063,224,,63,192,,63,192          DJ
·1060 DATA0,63,240,,60,96,,56              EJ
·1070 DATA064,,24,,,,,.                    BF
·1080 DATA0,,,,126,,1,255                  FE
·1090 DATA128,7,243,192,15,192,224,15      NH
·1100 DATA128,96,7,,96,,,96                BA
·1110 DATA0,,96,,,192,4,.                  OL
·1120 DATA128,2,3,,1,252,,.                BN
·1130 DATA0,,,,,,,.                        HN
·1140 DATA0,,,,,,,.                        JP
·1150 DATA0,,,,,,,.                        KJ
·1160 DATA0,,,,20,,,45                     CG
·1170 DATA0,,23,64,,63,224,.               FA
·1180 DATA013,208,,128,120,,,8             JB
·1190 DATA0,128,28,,128,8,,128             JO
·1200 DATA012,,96,12,,32,24,.              LE
·1210 DATA028,248,,3,96,,,.                GB
·1220 DATA0,,,,,,,.                        OP
·1230 DATA0,,,,,,,.                        PJ
·1240 DATA0,,,,,,,.                        OL
·1250 DATA0,,,,,,48,.                      GG
·1260 DATA004,120,,8,120,,16,124           II
·1270 DATA0,16,60,,16,30,,16               NI
·1280 DATA014,,16,14,,16,6,.               AL
·1290 DATA016,6,,8,14,,8,12                NP
·1300 DATA0,6,28,,3,248,,1                 OE
·1310 DATA240,,,,,,,.                      KH
·1320 DATA0,,,,,,,.                        EA
·1330 DATA0,,,,,,,.                        DC
·1340 DATA0,,,7,64,,4,.                    DP
·1350 DATA0,8,,,48,30,,32                  IP
·1360 DATA044,,32,62,,64,24,.              DC
·1370 DATA064,60,,32,40,,64,56             NA
·1380 DATA0,96,56,,49,96,,63               FO
·1390 DATA224,,13,,,,,.                    FC
·1400 DATA0,,,,,,,.                        JA
·1410 DATA0,,,,,,,.                        IC
·1420 DATA0,,,,,,,.                        JM
·1430 DATA0,63,128,,192,64,1,.             EN
·1440 DATA032,3,,,6,,,6                    HI
·1450 DATA0,,6,,224,6,1,240                BJ
·1460 DATA007,3,240,3,207,224,1,255        GP
·1470 DATA128,,126,,,,,.                   AJ
```

IMPORTANT! Letters on white background are **Bug Repellent** line codes. **Do not enter them!** Pages 81 and 82 explain these codes and provide other essential information on entering *Ahoy!* programs. Refer to these pages **before** entering any programs!

```
·1480 DATA0,,,,,,,.                OA
·1490 DATA0,,,,,,,.                NC
·1500 DATA0,,13,128,,22,96,.       MP
·1510 DATA056,24,,96,8,,96,6       AO
·1520 DATA0,32,2,,96,,,48          DJ
·1530 DATA002,,48,2,,63,96,.       NB
·1540 DATA013,176,,7,248,,1,104    NM
·1550 DATA0,,48,,,,,.              JI
·1560 DATA0,,,,,,,.                CN
·1570 DATA0,31,,,63,128,,112       AE
·1580 DATA192,,96,32,,224,32,.     DM
·1590 DATA192,16,,192,16,,224,16   LN
·1600 DATA0,224,16,,240,16,,120    FG
·1610 DATA016,,124,16,,60,32,.     IJ
·1620 DATA060,64,,24,,,,.          ME
·1630 DATA0,,,,,,,.                GD
·1640 DATA0,,,,176,,2,232          LJ
·1650 DATA0,7,188,,10,6,,30        ID
·1660 DATA006,,20,4,,24,2,.        IF
·1670 DATA060,2,,52,4,,124,4       EA
·1680 DATA0,88,4,,48,24,,.         CL
·1690 DATA032,,,32,,2,192,.        EN
·1700 DATA0,,,,,,,.                MB
·1710 DATA0,,,,,,,253              BE
·1720 DATA0,,,,,,,.                MN
·1730 DATA0,,,,,16,,.              GB
·1740 DATA129,,,32,,2,20,64        IA
·1750 DATA0,162,,1,81,,4,10        KB
·1760 DATA064,,84,,1,33,,.         GO
·1770 DATA0,,,68,,,,.              IO
·1780 DATA0,,,,,,,.                BB
·1790 DATA0,,,,,,,.                AD
·1800 DATA064,,2,,4,32,,128        HI
·1810 DATA0,,,2,8,,128,32          IH
·1820 DATA072,,,4,4,2,145,.        KJ
·1830 DATA016,4,,,160,32,4,9       CH
·1840 DATA0,128,80,,,4,34,8        DG
·1850 DATA0,,1,32,128,,,.          DO
·1860 DATA0,4,2,1,,,32,.           EP
·1870 DATA016,,1,,,32,1,,.         OI
·1880 REM INTERRUPT DATA           MJ
·1890 DATA120,169,21,141,20,3      MG
·1900 DATA169,12,141,21,3,169      PC
·1910 DATA4,133,251,169,7,133      AM
·1920 DATA252,88,96,198,251,208    MM
·1930 DATA25,169,4,133,251,165     AM
·1940 DATA252,24,105,85,162,6      PG
·1950 DATA157,249,31,202,208,250   BI
·1960 DATA198,252,16,4,169,7       NG
·1970 DATA133,252,76,101,250       LB
```

Problems entering our programs?
Call 212-239-6089

(if busy or no answer after three rings, call 212-239-0855)

CAVE OF THE ICE APE

FROM PAGE 37

Starting address in hex: C047
Ending address in hex: C0FD

APEMUSIC

```
C047: 78 A9 54 8D 14 03 A9 C0 CC
C04F: 8D 15 03 58 60 AD 94 C0 B0
C057: D0 28 AE 95 C0 E8 E0 68 87
C05F: D0 02 A2 00 BD 96 C0 8D 77
C067: 00 D4 E8 BD 96 C0 8D 01 C8
C06F: D4 E8 BD 96 C0 8D 04 D4 A8
C077: E8 BD 96 C0 8D 94 C0 8E E6
C07F: 95 C0 CE 94 C0 4C 31 EA 62
C087: 78 A9 31 8D 14 03 A9 EA 14
C08F: 8D 15 03 58 60 0E 47 8F D2
C097: 0A 11 0F 30 0B 11 0F 8F AC
C09F: 0C 11 0F D2 0F 11 0F C3 91
C0A7: 10 11 0F D2 0F 11 10 8F 6A
C0AF: 0C 11 0F D2 0F 11 0F 18 F5
C0B7: 0E 11 0F 30 0B 11 0F C3 05
C0BF: 10 11 0F D2 0F 11 0F 8F 81
C0C7: 0C 11 0F 8F 0A 11 0F 30 DD
C0CF: 0B 11 0F 8F 0C 11 0F D2 89
C0D7: 0F 11 0F C3 10 11 0F D2 CD
C0DF: 0F 11 0F 8F 0C 11 0F 1F E9
C0E7: 15 11 0F D1 12 11 0F A5 C6
C0EF: 1F 11 0F 31 1C 11 0F 60 FC
C0F7: 16 11 0F 1F 15 11 0F 82
```

CAVEAPE

```
·10 REM    CAVE OF THE ICE APE BY JC HILT
 Y                                            LH
·12 REM    CAVEAPE                            IL
·20 GOSUB680                                  DK
·30 SYS943:POKE2040,P:P=P+1:IFP=194THENP=
 192                                          ON
·40 ONLGOSUB90,110,130,150,170:SYS943         NL
·50 W1=PEEK(V+30):IFW1AND1THEN200             PP
·60 W2=PEEK(V+31):IFW2AND1THEN410             BB
·70 SYS943:SYS960,7,33:PRINTVAL(TI$):IFVA
 L(TI$)>40THEN410                             OH
·80 GOTO30                                    DJ
·90 X1=X1+Z:IFX1>236THENPOKEV+3,124:X1=23
 6:L=2                                        MF
·100 POKEV+2,X1:RETURN                        KA
·110 X1=X1-Z:IFX1<36THENX1=36:POKEV+3,156
 :L=3                                         PB
·120 POKEV+2,X1:RETURN                        LE
·130 X1=X1+Z:IFX1>236THENPOKEV+3,188:X1=2
 36:L=4                                       EJ
·140 POKEV+2,X1:RETURN                        OI
```

```
•150 X1=X1-Z:IFX1<36THENX1=36:POKEV+3,220
 :L=5                                     BD
•160 POKEV+2,X1:RETURN                    PM
•170 X1=X1+Z:IFX1>236THENX1=32:L=1:POKEV+
 21,61:POKEV+3,92:POKEV+2,X1:GOTO190      HA
•180 POKEV+2,X1:RETURN                    PA
•190 POKEV+21,63:RETURN                   CB
•200 IFW1AND2THEN410                      PO
•202 SYS65418                             GC
•210 FORX=0TO24:POKES+X,0:NEXT:POKES,150:
 POKES+1,200:POKES+5,8:POKES+6,248        LO
•220 POKES+24,15:POKES+4,17:FORT=0TO200:N
 EXT:FORX=0TO24:POKES+X,0:NEXT            CL
•230 TN=TN+1:SYS960,10,33:PRINTTN:IFTN=3T
 HEN530                                   BC
•240 A=INT(14*RND(5)+1)                   BE
•250 ONAGOSUB270,280,290,300,310,320,330,
 340,350,360,370,380,390,400              EE
•260 W1=PEEK(V+30):W2=PEEK(V+31):POKES+6,
 240:POKES+24,15:SYS49223:GOTO30          PD
•270 POKEV+8,36:POKEV+9,94:RETURN         KC
•280 POKEV+8,140:POKEV+9,94:RETURN        AA
•290 POKEV+8,232:POKEV+9,94:RETURN        CK
•300 POKEV+8,36:POKEV+9,126:RETURN        EM
•310 POKEV+8,140:POKEV+9,126:RETURN       IH
•320 POKEV+8,232:POKEV+9,126:RETURN       KB
•330 POKEV+8,36:POKEV+9,158:RETURN        GH
•340 POKEV+8,140:POKEV+9,158:RETURN       JI
•350 POKEV+8,232:POKEV+9,158:RETURN       HC
•360 POKEV+8,36:POKEV+9,190:RETURN        FB
•370 POKEV+8,140:POKEV+9,190:RETURN       LC
•380 POKEV+8,232:POKEV+9,190:RETURN       HM
•390 POKEV+8,36:POKEV+9,222:RETURN        HJ
•400 POKEV+8,140:POKEV+9,222:RETURN       LM
•410 SYS65418                             EH
•411 POKE2040,198:FORX=0TO24:POKES+X,0:NE
 XT:H=PEEK(V+1):POKES+24,15               ON
•420 POKES+5,80:POKES+12,160:POKES+6,255:
 POKES+13,252:POKES+4,17:POKES+4,16       NF
•430 FORI=254TO50STEP-4:POKES+1,I:FORJ=1T
 O5:NEXT:NEXT                             CI
•440 POKES+1,10:POKES+8,1:POKES+5,112:POK
 ES+6,252:POKES+4,129:POKES+11,129        KD
•450 FORX=0TO130:H=H+1:IFH>222THENH=222   CH
•460 POKEV+1,H:NEXT:FORX=0TO24:POKES+X,0:
 NEXT:POKES+6,240:POKES+24,15:SYS49223    KK
•470 LI=LI-1:SYS960,17,34:PRINTLI:IFLI=0T
 HEN1050                                  EG
•480 SYS960,7,34:PRINT"[3" "]":TN=0:SYS96
 0,10,33:PRINTTN:TI$="[6"0"]"             JH
•490 L=1:POKE2040,P:POKEV,232:POKEV+1,222
 :POKEV+2,36:POKEV+3,92:X1=36             EI
•500 A=INT(14*RND(6)+1)                   FI
•510 ONAGOSUB270,280,290,300,310,320,330,
 340,350,360,370,380,390,400              BJ
•520 W1=PEEK(V+30):W2=PEEK(V+31):GOTO30   GI
•530 SC=SC+100:SYS960,20,33:PRINTSC:POKEV
 ,112:POKEV+1,58:POKEV+21,127             LN
```

```
•540 SYS960,1,19:PRINT"[YELLOW]MY HERO!!"
 :GOSUB630                                HO
•550 TN=0:SYS960,10,33:PRINTTN:SYS960,7,3
 4:PRINT"[3" "]"                          FM
•560 SYS960,1,19:PRINT"[c 7]HELP ME!!"    DH
•570 POKEV,232:POKEV+1,222                JJ
•580 A=INT(14*RND(6)+1)                   HF
•590 ONAGOSUB270,280,290,300,310,320,330,
 340,350,360,370,380,390,400              PK
•600 POKEV+2,36:POKEV+3,92:X1=36:L=1:W1=P
 EEK(V+30):W2=PEEK(V+31)                  CF
•610 Z=Z+1:IFZ>12THENZ=12                 MP
•620 TI$="[6"0"]":POKEV+21,63:GOTO30      CE
•630 RESTORE                              AE
•631 SYS65418                             BN
•640 FORX=0TO24:POKES+X,0:NEXT:POKES+24,1
 5:POKES+5,85:POKES+6,85:POKES+4,33       IG
•650 FORX=0TO5:READH1,N1:POKES+1,H1:POKES
 ,N1                                      HF
•660 IFH1=50THENFORT=0TO400:NEXT          AD
•670 FORT=0TO200:NEXT:NEXT:FORX=0TO24:POK
 ES+X,0:NEXT:POKES+6,240:POKES+24,15      HJ
•672 SYS49223:RETURN                      AN
•680 POKE53280,0:POKE53281,0:PRINT"[CLEAR
 ][PURPLE]"TAB(11)"CAVE OF THE ICE APE"   AI
•690 PRINTTAB(15)"BY JC HILTY[12"[DOWN]"]
 ":PRINTTAB(10)"READING DATA[4"."]"       LP
•692 POKE147,0:SYS57812"APEMUSIC",8,1:SYS
 62631:S=54272:FORX=0TO24:POKES+X,0:NEXT  CN
•694 POKES+6,240:POKES+24,15:SYS49223     JL
•700 READH1,N1:IFH1=0THEN720              LM
•710 GOTO700                              OD
•720 FORX=828TO949:READA:POKEX,A:NEXT     KG
•730 FORX=960TO975:READA:POKEX,A:NEXT     MC
•740 FORX=12288TO12798:READA:POKEX,A:NEXT FI
•750 HS=0                                 GI
•760 SC=0:V=53248:LI=4:TN=0:P=192:L=1:X1=
 36:Z=4:TI$="[6"0"]"                      LO
•770 PRINT"[CLEAR][PURPLE][RVSON] [RVSOFF
 ][6" "][c 7][s Q]"TAB(30)"[RVSON][PURPLE
 ] [RVSOFF][BLUE][8"*"]"                  AL
•780 PRINT"[RVSON][PURPLE] [RVSOFF][5" "]
 [c 7][3"[s Q]"]"TAB(19)"[YELLOW]HELP ME!
 !  [RVSON][PURPLE] [RVSOFF]  [BLUE]CAVE" CO
•790 PRINT"[RVSON][PURPLE] [RVSOFF][4" "]
 [c 7][5"[s Q]"]"TAB(30)"[RVSON][PURPLE]
 [RVSOFF] [BLUE]OF THE"                   HG
•800 PRINT"[RVSON][PURPLE] [RVSOFF][3" "]
 [c 7][7"[s Q]"]"TAB(30)"[RVSON][PURPLE]
 [RVSOFF][BLUE]ICE APE"                   KF
•810 PRINT"[PURPLE][3"[sEP]"][c *][c *][3
 "[sEP]"][c *][c *][4"[sEP]"][c *][c *][s
 EP][3"[c *]"][sEP][sEP][3"[c *]"][sEP][s
 EP][c *][c *][sEP][c *][BLUE][8"*"]"     DH
•820 PRINT"[RVSON][PURPLE] "TAB(30)" ":PR
 INT"[RVSON] "TAB(30)" [RVSOFF]  [YELLOW]
 TIMER"                                   IH
•830 PRINT"[RVSON][PURPLE] "TAB(30)" "    IL
```

```
·840 PRINT"[PURPLE][sEP][sEP][3"[c *]"][s
 EP][sEP][4"[c *]"][4"[sEP]"][4"[c *]"][s
 EP][c *][sEP][c *][sEP][sEP][c *][c *][3
 " "][RVSON] "                                KG
·850 PRINT"[RVSON] "TAB(30)" [RVSOFF]  [Y
 ELLOW]TNT[PURPLE]"                           AE
·860 PRINT"[RVSON] "TAB(30)" [RVSOFF]  [c
  7]";TN                                      GL
·870 PRINT"[RVSON][PURPLE] "TAB(30)" ":PR
 INT"[RVSON] [RVSOFF][3" "][c *][c *][sEP
 ][3"[c *]"][sEP][sEP][c *][sEP][c *][3"
 "][sEP][sEP][c *][sEP][c *][sEP][3"[c *]
 "][3"[sEP]"][RVSON] "                        IE
·880 FORX=0TO2:PRINT"[RVSON] "TAB(30)" ":
 NEXT                                         IC
·890 PRINT"[RVSON] [RVSOFF][3"[sEP]"][c *
 ][c *][sEP][c *][sEP][c *][3"[sEP]"][3"[
 c *]"][sEP][sEP][c *][c *][sEP][sEP][3"[
 c *]"][sEP][sEP][3" "][RVSON] [RVSOFF]
 [YELLOW]LIVES"                               JN
·900 PRINT"[RVSON][PURPLE] "TAB(30)" [RVS
 OFF]  [c 7]";LI:PRINT"[RVSON][PURPLE] "T
 AB(30)" "                                    CL
·910 PRINT"[RVSON] "TAB(30)" [RVSOFF]  [Y
 ELLOW]SCORE":PRINT"[RVSON][PURPLE] [RVSO
 FF][3" "][c *][c *][3"[sEP]"][c *][sEP][
 c *][3"[sEP]"][3" "][sEP][sEP][c *][c *]
 [3"[sEP]"][3"[c *]"][sEP][sEP][RVSON] "; BE
·920 PRINTTAB(33)"[RVSOFF][c 7]";SC:PRINT
 "[RVSON][PURPLE] "TAB(30)" ":PRINT"[RVSO
 N] "TAB(30)" [RVSOFF]  [YELLOW]HIGH"         NE
·930 PRINT"[RVSON][PURPLE] "TAB(30)" [RVS
 OFF]  [c 7]";HS                              BM
·940 FORX=56256TO56286:POKEX,4:NEXT:FORX=
 1984TO2014:POKEX,160:NEXT                    CF
·950 POKEV+28,45:POKEV+16,32:POKEV+37,1:P
 OKEV+38,8:POKEV+23,96:POKEV+29,96            CN
·960 POKE2040,P:POKEV+39,5:POKEV,232:POKE
 V+1,222                                      DD
·970 POKE2041,197:POKEV+40,14:POKEV+2,36:
 POKEV+3,92                                   IB
·980 POKE2042,195:POKEV+41,14:POKEV+4,32:
 POKEV+5,58                                   AD
·990 POKE2043,194:POKEV+42,2:POKEV+6,144:
 POKEV+7,54                                   JL
·1000 POKE2044,196:POKEV+43,2:POKEV+8,140
 :POKEV+9,126                                 GK
·1010 POKE2045,195:POKEV+44,14:POKEV+10,3
 0:POKEV+11,132                               JM
·1020 POKE2046,199:POKEV+45,2:POKEV+12,11
 6:POKEV+13,40                                LL
·1030 W1=PEEK(V+30):W2=PEEK(V+31)             FG
·1040 POKEV+21,63:RETURN                      HH
·1050 POKEV+21,47:SYS960,14,11:PRINT"[c 7
 ]GAME OVER"                                  CO
·1060 PRINTTAB(7)"PLAY AGAIN  Y OR N"         GN
·1070 IFSC>HSTHENHS=SC                        DK
·1080 SYS960,23,33:PRINTHS                    DC
```

```
·1090 GETJK$:IFJK$<>""THEN1090                GB
·1100 GETP$:IFP$=""THEN1100                   PK
·1110 IFP$="Y"THEN1140                        BG
·1120 IFP$="N"THENSYS65418:FORX=0TO24:POK
 ES+X,0:NEXT:END                              OJ
·1130 GOTO1100                                LJ
·1140 GOSUB760:GOTO30                         NJ
·1150 DATA 25,30,33,135,42,62,50,60,42,62
 ,50,60,0,0                                   HE
·1160 REM    JOYSTICK PORT 1                  ON
·1170 DATA 173,1,220,74,176,3,206,1,208,7
 4,176,3,238,1,208,74,176,42,173              JC
·1180 DATA 0,208,208,31,173,16,208,41,1,2
 08,16,173,16,208,9,1,141,16,208              HJ
·1190 DATA 169,80,141,0,208,96,234,234,17
 3,16,208,41,254,141,16,208,206               LF
·1200 DATA 0,208,96,234,234,74,176,32,238
 ,0,208,240,30,169,80,205,0,208               OP
·1210 DATA 208,20,173,16,208,41,1,240,13,
 173,16,208,41,254,141,16,208,169             KJ
·1220 DATA 0,141,0,208,96,234,234,173,16,
 208,9,1,141,16,208,96,234,234                KJ
·1230 DATA 32,60,3,32,60,3,32,60,3,32,60,
 3,96                                         HF
·1240 REM                                     GN
·1250 DATA 32,155,183,138,72,32,155,183,1
 04,170,164,101,24,76,240,255                 CO
·1260 REM    SPRITE DATA                      GJ
·1270 DATA 0,0,0,0,60,0,0,52,0,0,20,0,0,1
 6,0,0,40,0,0,168,0,0,170,64,0,168,0          LP
·1280 DATA 0,156,0,0,40,0,0,40,0,0,130,0,
 0,130,0,0,243,192,0,0,0,0,0,0,0,0,0          FL
·1290 DATA 0,0,0,0,0,0,0,0,0,0                ML
·1300 DATA 0,0,0,0,60,0,0,52,0,0,20,0,0,1
 6,0,0,40,0,0,168,0,0,168,0,0,168,0           IB
·1310 DATA 0,188,0,0,104,0,0,40,0,0,40,0,
 0,40,0,0,63,0,0,0,0,0,0,0,0,0,0,0,0          BC
·1320 DATA 0,0,0,0,0,0,0                      BG
·1330 DATA 0,0,0,3,192,0,15,252,0,63,220,
 0,63,92,0,63,92,0,63,92,0,63,127,0           KA
·1340 DATA 63,127,0,15,160,0,2,160,0,2,16
 0,0,0,128,0,0,128,0,2,160,0,2,160,0          CM
·1350 DATA 0,64,0,0,64,0,0,64,0,2,96,0,0,
 0,0,0                                        EO
·1360 DATA 0,0,0,0,0,0,0,136,0,0,32,0,2,1
 70,0,0,40,0,0,191,0,2,204,204                JH
·1370 DATA 2,255,240,2,191,12,2,159,252,1
 0,148,0,42,150,164,40,150,160                PL
·1380 DATA 32,149,0,32,149,64,16,149,64,2
 ,170,128,10,170,160,40,0,40,168,0,42,0       NL
·1390 DATA 0,136,0,0,0,0,0,74,0,0,16,0,3,
 224,0,4,10,0,8,0,0,16,16,0,16,0,0            GI
·1400 DATA 16,0,0,15,255,248,12,107,24,14
 ,227,184,14,235,184,15,255,248               EF
·1410 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
 0,0,0,0                                      JI
·1420 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,31,0
 ,0,63,128,0,127,192,0,255,224                CP
```

```
•1430 DATA 1,255,240,3,255,248,3,255,248,
 3,255,248,3,255,248,3,255,240,1,255,224  NN
•1440 DATA 0,255,192,0,127,128,0,31,0,0,0
 ,0,0,0,0,0,0,0,0,0                       MO
•1450 DATA 0,0,0,0,12,0,0,12,0,0,55,0,0,5
 5,0,0,14,32,0,12,128,0,2,32,0,0,8        NG
•1460 DATA 0,0,8,3,74,12,3,90,172,3,218,1
 72,0,0,0,0,0,0,0,0,0,0,0,0,0             HJ
•1470 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0    NI
•1480 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
 3,199,128,7,239,192,15,239,224           FM
•1490 DATA 15,255,224,15,255,224,15,255,2
 24,7,255,192,3,255,128,1,255,0           II
•1500 DATA 0,254,0,0,124,0,0,56,0,0,16,0,
 0,0,0,0,0,0,0,0,0,0                      FL
```

POWER SQUARES

FROM PAGE 41

```
•10 POKE53280,0:POKE53281,0:POKE828,1     CG
•20 PRINT"[CLEAR][WHITE][3"[DOWN]"]"TAB(1
 3)"POWER SQUARES"                        OI
•30 PRINTTAB(93)"BY JOHN FEDOR"           GK
•40 GOSUB680:GOSUB960:PRINT"[DOWN][DOWN][
 3" "]HOW MANY PLAYERS (D, 1 OR 2) ? ";   EM
•50 POKE198,0                             MP
•60 GETA$:IF(A$<"1"ORA$>"2")ANDA$<>"D"THE
 N60                                      IF
•70 PRINTA$                               EF
•80 PL=VAL(A$)                            BE
•90 DIM A(5,5):REM THE GRID               MH
•100 Z=1:POKEV,100:POKEV+1,76             AA
•110 FORY=1TO5:FORX=1TO5                  LH
•120 IFX=3ANDY=3THEN140                   FI
•130 A(X,Y)=Z+1                           MA
•140 Z=1-Z:NEXTX,Y                        DJ
•150 PRINT"[CLEAR][3"[DOWN]"]":TU=1       OA
•151 PRINT"[HOME]"TAB(32)"[CYAN][c D][5"[
 c I]"][c F]"                             AC
•152 PRINTTAB(32)"[RVSON][c K][BLUE][5" "
 ][RVSOFF][CYAN][c K]"                    PE
•153 PRINTTAB(32)"[RVSON][c K][BLUE][5" "
 ][RVSOFF][CYAN][c K]"                    PN
•154 PRINTTAB(32)"[RVSON][c K][BLUE]  [RI
 GHT][RED]  [RVSOFF][CYAN][c K]"          OM
•155 PRINTTAB(32)"[RVSON][c K][RED][5" "]
 [RVSOFF][CYAN][c K]"                     NG
•156 PRINTTAB(32)"[RVSON][c K][RED][5" "]
 [RVSOFF][CYAN][c K]"                     PL
•157 PRINTTAB(32)"[c C][RVSON][5"[c I]"][
 RVSOFF][c V]"                            AC
•158 PRINT"[HOME][3"[DOWN]"]"             MC
•160 PRINTTAB(11)"[RVSON][CYAN][17" "][RV
 SOFF]"                                   BN
•170 FORY=1TO15                           GO
•180 PRINTTAB(11)"[RVSON] [15"[RIGHT]"] " NO
•190 NEXTY                                JL
•200 PRINTTAB(11)"[RVSON][CYAN][17" "][RV
 SOFF][HOME]"                             AI
•210 C$(1)="[BLUE]":C$(2)="[RED]":C$(0)="
 [BLACK]":WI=0                            JO
•220 PRINT"[HOME][5"[DOWN]"]"TAB(12);:FOR
 Y=1TO5:FORX=1TO5                         AH
•230 PRINTC$(A(X,Y))"[RVSON][3" "][DOWN][
 3"[LEFT]"][3" "][DOWN][3"[LEFT]"][3" "][
 UP][UP]";                                MN
•240 NEXTX:PRINT"[DOWN][DOWN]"CHR$(13)TAB
 (12):NEXTY                               MC
•245 IFWI<>0THEN800                       ON
•250 T$(1)="BLUE":T$(2)="RED"             EH
•260 PRINT"[HOME][WHITE]"T$(TU)"'S TURN "
 :POKEV+21,1                              OE
•270 IFTU=2ANDPL=1ORPL=0THEN750           LJ
•280 IF(PEEK(56322-TU)AND16)<>16THEN280   PE
•290 X=(PEEK(V)-100)/24+1                 NL
•300 Y=(PEEK(V+1)-76)/24+1                AD
•310 J=(PEEK(56322-TU)AND15)              BM
•320 IF(JAND1)=1THENY=Y+1                 BA
•330 IF(JAND2)=2THENY=Y-1                 AF
•340 IF(JAND4)=4THENX=X+1                 CM
•350 IF(JAND8)=8THENX=X-1                 DF
•360 IFX=0THENX=1                         AL
•370 IFX=6THENX=5                         BP
•380 IFY=0THENY=1                         BF
•390 IFY=6THENY=5                         DJ
•400 POKEV,100+(X-1)*24:POKEV+1,76+(Y-1)*
 24                                       DC
•410 IF(PEEK(56322-TU)AND16)=16THEN290    FM
•420 IFA(X,Y)<>TUTHEN290                  MB
•422 REM COMPARE TO SEE IF ON SAME X / Y  OI
•430 FORI=-5TO5:IFX+I<1ORX+I>5THEN443     AE
•432 IFA(X+I,Y)<>0 THEN 443               HL
•435 K=SGN(I):FOR I1= I TO 0 STEP-K       HC
•437 IF X+I1-K<1 OR X+I1-K>5THEN440       JG
•438 A(X+I1,Y)=A(X+I1-K,Y)                HL
•440 NEXTI1:GOTO480                       BL
•443 NEXTI                                IB
•445 FORI=-5TO5:IFY+I<1ORY+I>5THEN455     GK
•446 IFA(X,Y+I)<>0 THEN 455               HC
•447 K=SGN(I):FOR I1=I TO 0 STEP-K        KO
•448 IF Y+I1-K<1 OR Y+I1-K>5THEN451       KD
•450 A(X,Y+I1)=A(X,Y+I1-K)                GJ
•451 NEXTI1:GOTO480                       BE
•455 NEXTI                                JF
•470 GOTO270                              PE
•480 A(X,Y)=0                             DD
•490 TU=TU+1:IFTU=3THENTU=1               FE
•500 FORY1=-5TO5:FORX1=-5TO5              AM
•510 IFX1<>0 AND Y1<>0THEN550             MG
•520 IFY+Y1<1ORY+Y1>5ORX+X1<1ORX+X1>5THEN
 550                                      EP
```

```
•530 IFA(X+X1,Y+Y1)<>TUTHEN550              NB
•540 FORY1=1TO1:FORX1=1TO1:NEXTX1,Y1:GOTO
 560                                        JL
•550 NEXTX1,Y1:GOTO490                      FC
•560 FORY=1TO2:FORX=1TO5:IFA(X,Y)=1THENNE
 XTX,Y:IFA(1,3)=1ANDA(2,3)=1THENWI=1        LF
•570 FORY=4TO5:FORX=1TO5:IFA(X,Y)=2THENNE
 XTX;Y:IFA(4,3)=2ANDA(5,3)=2THENWI=2        BD
•580 GOTO220                                GO
•600 DATA0,0,0,0,0,0,0,0                    KA
•610 DATA0,0,0,0,0,0,0,0                    KO
•620 DATA0,0,0,0,0,0,127,252                GL
•630 DATA0,127,252,0,96,12,0,96             JO
•640 DATA12,0,96,12,0,96,12,0               ME
•650 DATA96,12,0,96,12,0,96,12              CP
•660 DATA0,96,12,0,127,252,0,127            AD
•670 DATA252,0,0,0,0,0,0,0                  BC
•680 FORI=0TO63:READA:POKE832+I,A:NEXTI     BO
•685 FORI=49152TO49206:READA:POKEI,A:NEXT
 :SYS49152                                  EK
•690 V=53248                                LP
•700 POKEV+21,0:POKEV+23,1:POKEV+29,1       GF
•710 POKEV+28,0:POKEV+39,1                  ME
•720 POKE2040,13                            LG
•730 POKEV,148:POKEV+1,124                  EG
•740 RETURN                                 HE
•750 REM COMPUTER'S TURN                    LK
•755 Y1=INT(RND(1)*5)+1                     HG
•760 X1=INT(RND(1)*5)+1                     AM
•764 IFT4(TU)=X1+(Y1)*6THEN755              PH
•766 T4(TU)=X+(Y)*6                         JG
•767 POKEV,76+(X1)*24:POKEV+1,52+(Y1)*24    NN
•770 IFA(X1,Y1)<>TUTHEN755                  IC
•780 X=X1:Y=Y1:GOTO420                      PC
•800 REM END OF GAME                        EK
•810 POKEV+21,0                             HO
•820 FORX=0TO255:POKE53281,X:POKE53280,25
 5-X:NEXTX                                  IE
•830 POKE53280,0:POKE53281,0                FM
•840 X1=2:IFWI=1THENX1=6                    PJ
•850 POKE53280,X1                           LB
•860 PRINT"[CLEAR][WHITE][3"[DOWN]"]"T$(W
 I)" WON[3"!"]"                             GE
•870 PRINTTAB(6)"[19"[DOWN]"]PRESS <RETUR
 N> TO PLAY AGAIN"                          FP
•875 PRINTTAB(7)"OR PRESS EITHER FIREBUTT
 ON[HOME]"                                  PG
•880 POKE198,0                              AE
•890 GETA$:IFA$<>CHR$(13)AND(PEEK(56321)A
 ND16)=16AND(PEEK(56320)AND16)=16THEN890    GP
•895 POKE198,0:RUN                          OA
•900 DATA120,169,13,141,20,3,169,192        NJ
•910 DATA141,21,3,88,96,172,60,3,136        GB
•920 DATA140,60,3,208,24,160,5,140,60       LF
•930 DATA3,174,61,3,189,49,192,141,39       EA
•940 DATA208,232,224,6,208,2,162,0,142      MF
•950 DATA61,3,76,49,234,1,3,14,6,14,3       PC
•960 PRINT"[8"[DOWN]"]"TAB(17)"[RVSON][BL
 UE][5" "]"                                 EO
•962 FORX=1TO3                              FI
•965 PRINTTAB(17)"[RVSON] [WHITE][3" "][B
 LUE] "                                     KI
•970 NEXTX                                  KD
•975 PRINTTAB(17)"[RVSON][5" "][RVSOFF][W
 HITE]"                                     CF
•980 PRINT"[HOME][6"[DOWN]"]"               BB
•990 POKEV,149:POKEV+1,164:POKEV+21,1       KB
•995 RETURN                                 HE
```

D-SNAP

FROM PAGE 27

```
•0 DIMSC$(255),QT(254),QS(254):GOTO60000    CM
•1 POKETX,11:POKETY,0:SYS828:PRINTTR"[LEF
 T] ";                                      LJ
•2 POKETX,25:POKETY,0:SYS828:PRINTSC"[LEF
 T] ";                                      JL
•3 PRINT"[HOME][DOWN]";                     DD
•4 FORX=0TO255:PRINTSC$(PEEK(BASE+X));:NE
 XT                                         DJ
•5 RETURN                                   JD
•6 POKECB+LP+40,5:POKECB+PS+40,1            JC
•7 NUM=PEEK(BASE+PS):POKETX,13:POKETY,10:
 SYS828:PRINT"[5" "][6"[LEFT]"]";PS         MK
•8 POKETX,13:POKETY,11:SYS828:PRINT"[5" "
 ][5"[LEFT]"]";SC$(NUM)                     IL
•9 POKETX,13:POKETY,12:SYS828:PRINT"[5" "
 ][5"[LEFT]"]";MID$(HX$,(INT(NUM/16))+1,1
 );                                         IK
•10 PRINTMID$(HX$,NUM-16*(INT(NUM/16))+1,
 1)                                         PL
•12 POKETX,13:POKETY,13:SYS828:PRINT"[4"
 "][5"[LEFT]"]";NUM                         OB
•15 RETURN                                  JN
•16 IFA$<>"[UP]"ANDA$<>"[DOWN]"ANDA$<>"[R
 IGHT]"ANDA$<>"[LEFT]"THENGOTO32            PK
•17 IFA$="[RIGHT]"THENLP=PS:PS=PS+1:IFPS>
 255THENPS=0:GOSUB6:GOTO30                  CL
•18 IFA$="[LEFT]"THENLP=PS:PS=PS-1:IFPS<0
 THENPS=255:GOSUB6:GOTO30                   IF
•19 IFA$="[LEFT]"ORA$="[RIGHT]"THENGOSUB6
 :GOTO30                                    KA
•20 IFA$="[UP]"ANDPS>39THENLP=PS:PS=PS-40
 :GOSUB6:GOTO30                             PL
•21 IFA$="[DOWN]"ANDPS<216THENLP=PS:PS=PS
 +40:GOSUB6:GOTO30                          ME
•23 IFA$="[UP]"ANDPS>15THENLP=PS:PS=PS+20
 0:GOSUB6:GOTO30                            EF
•24 IFA$="[UP]"ANDPS<16THENLP=PS:PS=PS+24
 0:GOSUB6:GOTO30                            ND
•25 IFA$="[DOWN]"ANDPS<240THENLP=PS:PS=PS
 -200:GOSUB6:GOTO30                         EL
•26 IFA$="[DOWN]"ANDPS>239THENLP=PS:PS=PS
 -240:GOSUB6:GOTO30                         IC
•28 GOSUB59000:GOSUB50000:GOSUB1:GOSUB6     JF
```

```
•30 GETA$:IFA$=""THEN30                      DC
•31 GOTO16                                   AK
•32 IFA$="+"THENGOSUB52500:GOSUB50000:GOS
UB1:GOSUB6:GOTO30                            PD
•33 IFA$="-"THENGOSUB52600:GOSUB50000:GOS
UB1:GOSUB6::GOTO30                           HN
•34 IFA$="$"THENGOSUB52000:GOTO28            JE
•35 IFA$="@"THENGOSUB54000:GOTO28            HL
•36 IFA$="N"THENGOSUB52700:GOSUB50000:GOS
UB1:GOSUB6:GOTO30                            OI
•37 IFA$="J"THENGOSUB52800:GOSUB50000:GOS
UB1:GOSUB6:GOTO30                            PO
•38 IFA$=" "THENGOSUB50000:GOSUB1:GOSUB6:
GOTO30                                       NL
•39 IFA$="*"THENGOSUB59000:GOSUB1:GOSUB6:
GOTO30                                       HD
•41 IFA$="R"THENGOSUB54500:GOSUB50000:GOS
UB59000:GOSUB1:GOSUB6:GOTO30                 JB
•42 IFA$="W"THENGOSUB54596:GOSUB51000:GOS
UB59000:GOSUB1:GOSUB6:GOTO30                 MF
•43 IFA$="S"THENGOSUB45900:GOSUB59000:GOS
UB1:GOSUB6:GOTO30                            KB
•44 IFA$="C"THENGOSUB53000:GOSUB59000:GOS
UB1:GOSUB6:GOTO30                            JE
•45 IFA$="?"THENGOSUB42000:GOTO30            KI
•46 IFA$="[s Q]"THENPRINT"[CLEAR]  [s O][
s K]. [s R]EADY":END                         LL
•99 GOTO30                                   EO
•100 IN$=""                                  BH
•101 PRINT"[RVSON] [RVSOFF][LEFT]";          MN
•102 GETA$:IFA$=""THEN102                    NG
•103 IF(A$="[LEFT]"ORA$=CHR$(20))ANDLEN(I
N$)=0THEN102                                 JL
•104 IFA$=CHR$(13)THENPRINT" ":RETURN        PD
•105 IFA$="[LEFT]"ORA$=CHR$(20)THENPRINT"
 [LEFT] [LEFT][LEFT][RVSON] [RVSOFF][LEF
T]";:IN$=MID$(IN$,1,LEN(IN$)-1):GOTO102      MP
•106 IFA$<CHR$(32)ORA$>"[s Z]"THEN102        MJ
•107 IN$=IN$+A$                              KM
•120 PRINT" [LEFT]";A$;"[RVSON] [RVSOFF][
LEFT]";                                      MC
•121 GOTO102                                 JG
•199 STOP                                    FH
•39999 END                                   FL
•42000 OPEN3,4,7                             EP
•42001 PRINT#3,"[s B]LOCK [s D]UMP OF [s
T]RACK# ";TR;"[3" "][s S]ECTOR# ";SC:PRI
NT#3,                                        PB
•42002 FOR X = 0 TO 255                      KE
•42003 IFX/80=INT(X/80)THENPRINT#3,          HC
•42004 PRINT#3,SC$(PEEK(BASE+X));            CD
•42005 NEXT                                  DL
•42020 FOR X = 0 TO 255                      MK
•42021 IFX/26=INT(X/26)THENPRINT#3,          FE
•42022 NX=PEEK(BASE+X):B1$=MID$(HX$,INT(N
X/16)+1,1)                                   JJ
•42023 B2$=MID$(HX$,NX-(16*INT(NX/16))+1,
1)                                           LA
•42024 PRINT#3,B1$B2$" ";                    IH
•42030 NEXT                                  FE
•42035 PRINT#3,:PRINT#3,"[s E]ND [s O]F [
s D]UMP.":PRINT#3,                           EA
•42066 CLOSE3:RETURN                         IM
•45900 PRINT"[CLEAR][s D]O YOU WANT [RVSO
N][s N][RVSOFF]ORMAL TEXT"                   LH
•45901 PRINT "[9" "]OR [RVSON][s U][RVSOF
F]NSTRIPPED TEXT?"                           BM
•45902 GETA$:IFA$<>"N"ANDA$<>"U"THEN45902    JF
•45903 SB=0:IFA$="U"THENSB=128               DM
•45904 PRINT"[s E]NTER THE TEXT STRING ON
 THE NEXT LINE"                              IO
•45905 GOSUB100                              CF
•45906 IFPS+LEN(IN$)>=256THENIN$=MID$(IN$
,1,256-PS)                                   PN
•45910 FORX=1TOLEN(IN$)                      CB
•45911 VL=ASC(MID$(IN$,X,1))                 BF
•45912 POKEBASE+PS+X-1,VLOR SB               BJ
•45913 NEXT                                  IO
•45914 RETURN                                JL
•49599 STOP                                  BA
•49999 STOP                                  KC
•50000 OPEN15,8,15:INPUT#15,X:IFX<>0ANDX<
>73THEN62000                                 KI
•50001 OPEN2,8,2,"#"                         DC
•50002 PRINT#15,"U1";2;0;TR;SC               IL
•50003 SYS49152                              MP
•50004 CLOSE2                                OB
•50005 CLOSE15                               CF
•50006 SYS65511                              KB
•50007 RETURN                                KI
•51000 IFD$<>"[s Y]"ANDD$<>"Y"THENRETURN     MG
•51001 OPEN15,8,15:INPUT#15,RX:IFRX<>0AND
RX<>73THEN62000                              DB
•51002 OPEN2,8,2,"#"                         CP
•51003 PRINT#15,"B-P";2;0                    BL
•51004 SYS49175                              KH
•51005 PRINT#15,"U2";2;0;TR;SC               GD
•51006 CLOSE2                                NP
•51007 CLOSE15                               AL
•51009 RETURN                                JG
•52000 PRINT"[CLEAR][12" "][RVSON][s D]IR
ECTORY[RVSOFF][DOWN]":OPEN2,8,0,"$0":GET
#2,A$,A$                                     LG
•52001 GET#2,A$,A$                           PC
•52002 GET#2,A$,B$:SZ=ASC(A$+Z$)+256*ASC(
B$+Z$):IFSZ=0THENPRINTTAB(7);"[RVSON]";      AE
•52003 IFSZ>0THENPRINTSZ;:PRINTTAB(7);       FH
•52004 GETG$:IFG$<>""THEN52101               LB
•52005 GET#2,A$:IFST<>0THEN52100             EH
•52006 IFA$<>Q$THEN52005                     EF
•52007 GET#2,A$:IFA$<>Q$THENPRINTA$;:GOTO
52007                                        GL
•52008 PRINTTAB(29);                         PC
•52009 GET#2,A$:IFA$=SP$THEN52008            ID
•52010 PRINTA$;                              CN
•52011 GET#2,A$:IFA$<>""THENPRINTA$;:GOTO
```

```
52011                                      HB
•52012 PRINT:IFST=0THEN52001               FH
•52100 PRINT"[3"[LEFT]"] [s B]LOCKS FREE.
"                                          OG
•52101 CLOSE2:PRINT                        PO
•52102 PRINT"[3"[DOWN]"] [RVSON][6" "][s
P][s R][s E][s S][s S] [s A][s N][s Y] [
s K][s E][s Y] [s T][s O] [s C][s O][s N
][s T][s I][s N][s U][s E][7" "][RVSOFF]
"                                          DK
•52103 GETA$:IFA$=""THEN52103              PH
•52104 RETURN                              OB
•52500 SC=SC+1                             LB
•52510 IFSC>16ANDTR>30THENTR=TR+1:SC=0:GO
TO52550                                    IK
•52520 IFSC>17ANDTR>24THENTR=TR+1:SC=0:RE
TURN                                       GK
•52530 IFSC>18ANDTR>17THENTR=TR+1:SC=0:RE
TURN                                       ID
•52540 IFSC>20THENTR=TR+1:SC=0:RETURN      DP
•52550 IFTR>35THENTR=1:RETURN              GD
•52560 RETURN                              KL
•52600 SC=SC-1                             PC
•52610 IFSC>=0THENRETURN                   DD
•52620 TR=TR-1:IFTR<18ANDTR>0THENSC=20:RE
TURN                                       FE
•52625 IFTR<1THENTR=35:GOTO52650           LF
•52630 IFTR<25THENSC=18:RETURN             PE
•52640 IFTR<31THENSC=17:RETURN             MM
•52650 SC=16:RETURN                        OD
•52700 OT=TR:OS=SC:E=0                     AK
•52710 TR=PEEK(BASE):SC=PEEK(BASE+1)       ID
•52720 IFTR<1ORTR>35THENE=1                PH
•52730 IFTR>30ANDSC>16THENE=1:GOTO52770    ML
•52740 IFTR>24ANDSC>17THENE=1:GOTO52770    DG
•52750 IFTR>17ANDSC>18THENE=1:GOTO52770    NJ
•52760 IFSC>20THENE=1                      PP
•52770 IFE=0THENRETURN                     NF
•52780 PRINT"[CLEAR][4" "][s E]RROR.  [s
T]HE BLOCK YOU ATTEMPTED TO "              DN
•52781 PRINT"[DOWN][3" "]READ WAS AT TRAC
K"TR" SECTOR"SC"                           HM
•52782 PRINT"[DOWN][3" "]DOES NOT EXIST.
[s I]T IS AN ILLEGAL"                      LC
•52783 PRINT"[DOWN][3" "]TRACK-SECTOR REF
ERENCE."                                   JO
•52784 PRINT"[DOWN][3" "][RVSON][s P][s R
][s E][s S][s S] [s A][s N][s Y] [s K][s
 E][s Y] [s T][s O] [s C][s O][s N][s T]
[s I][s N][s U][s E][RVSOFF]"              JE
•52785 GETA$:IFA$=""THEN52785              NG
•52786 TR=OT:SC=OS:E=0:GOSUB59000:RETURN   OK
•52800 OT=TR:OS=SC:E=0                     IB
•52810 TR=PEEK(BASE+PS):SC=PEEK(BASE+PS+1
)                                          OH
•52820 IFTR<1ORTR>35THENE=1                IK
•52830 IFTR>30ANDSC>16THENE=1:GOTO52870    DP
•52840 IFTR>24ANDSC>17THENE=1:GOTO52870    IP
```

```
•52850 IFTR>17ANDSC>18THENE=1:GOTO52870    HK
•52860 IFSC>20THENE=1                      EL
•52870 IFE=0THENRETURN                     DJ
•52880 PRINT"[CLEAR][4" "][s E]RROR.  [s
T]HE BLOCK YOU ATTEMPTED TO "              PB
•52881 PRINT"[DOWN][3" "]READ WAS AT TRAC
K"TR" SECTOR"SC"                           HA
•52882 PRINT"[DOWN][3" "]DOES NOT EXIST.
[s I]T IS AN ILLEGAL"                      HG
•52883 PRINT"[DOWN][3" "]TRACK-SECTOR REF
ERENCE."                                   OC
•52884 PRINT"[DOWN][3" "][RVSON][s P][s R
][s E][s S][s S] [s A][s N][s Y] [s K][s
 E][s Y] [s T][s O] [s C][s O][s N][s T]
[s I][s N][s U][s E][RVSOFF]"              IA
•52885 GETA$:IFA$=""THEN52885              DL
•52886 TR=OT:SC=OS:E=0:GOSUB59000:RETURN   LO
•53000 POKETX,0:POKETY,22:SYS828           PK
•53001 PRINT"[39" "]";                     FD
•53002 POKETX,0:POKETY,22:SYS828           OE
•53003 PRINT" [RVSON][s H][RVSOFF]EX OR [
RVSON][s D][RVSOFF]ECIMAL ? ([s H]/[s D]
)"                                         BJ
•53004 GETA$:IFA$<>"D"ANDA$<>"H"THEN53004  AO
•53005 POKETX,0:POKETY,22:SYS828           DH
•53006 PRINT"[39" "]";                     FC
•53007 POKETX,0:POKETY,22:SYS828           FB
•53008 IFA$="D"THEN53100                   JJ
•53009 POKETX,0:POKETY,22:SYS828           BL
•53010 HB$=MID$(HX$,INT(NUM/16)+1,1)+MID$
(HX$,NUM-16*INT(NUM/16)+1,1)               AA
•53011 PRINT" [s E]NTER NEW [s H][s E][s
X] VALUE ==>"HB$"<==[4"[LEFT]"]"           NE
•53019 POKETX,24:POKETY,22:SYS828          FH
•53020 POKE204,0:POKE207,0:GETA$:IFA$=""T
HEN53020                                   LJ
•53021 IFA$<"A"ANDA$>"9"THENPOKE53281,1:P
OKE53281,0:GOTO53020                       PE
•53022 IFA$>"F"ORA$<"0"THENPOKE53281,1:PO
KE53281,0:GOTO53020                        HC
•53024 POKETX,24:POKETY,22:H1$=A$:SYS828   DK
•53025 IFA$>":"THENHN=16*(9+ASC(A$)-64):P
RINTCHR$(128+ASC(A$));:GOTO53030           PE
•53026 HN=16*VAL(A$):PRINTA$;              FD
•53030 POKE204,0:POKE207,0:GETA$:IFA$=""T
HEN53030                                   JK
•53040 IFA$=CHR$(20)ORA$=CHR$(157)THENPOK
E207,1:POKE204,0:GOTO53007                 OP
•53041 IFA$<"A"ANDA$>"9"THENPOKE53281,1:P
OKE53281,0:GOTO53030                       FJ
•53042 IFA$>"F"ORA$<"0"THENPOKE53281,1:PO
KE53281,0:GOTO53030                        AH
•53044 POKE204,1:POKETX,25:POKETY,22:H2$=
A$:SYS828                                  IB
•53045 IFA$>":"THENLN=(9+ASC(A$)-64):PRIN
TCHR$(128+ASC(A$));:GOTO53050              BA
•53046 LN=VAL(A$):PRINTA$;                 FJ
•53050 POKETX,0:POKETY,22:SYS828           FE
```

```
•53051 PRINT"[39" "]";                       IF
•53099 POKEBASE+PS,HN+LN:RETURN              DA
•53100 POKETX,0:POKETY,22:SYS828             BO
•53101 PRINT"[39" "]";                       IH
•53102 POKETX,0:POKETY,22:SYS828             DI
•53103 PRINT" [s E]NTER [s D][s E][s C][s
  I][s M][s A][s L] VALUE ==> "NUM           GK
•53110 POKETX,24:POKETY,22:SYS828            KO
•53111 INPUTA$                               DB
•53112 IFVAL(A$)>255ORMID$(A$,1,1)>"9"ORM
 ID$(A$,1,1)<"0"THEN53100                    IM
•53198 POKETX,0:POKETY,22:SYS828             JI
•53199 PRINT"[39" "]";                       BJ
•53200 NUM=VAL(A$)                           LG
•53201 POKEBASE+PS,NUM:RETURN                GL
•54000 POKETY,22:POKETX,0:SYS828             BD
•54001 PRINT"[39" "]"                        NC
•54002 POKETY,22:POKETX,0:SYS828             DF
•54010 PRINT" [s E]NTER THE [s D][s O][s
 S] COMMAND>";                               PH
•54011 GOSUB100:L$=MID$(IN$,1,1):A$=IN$      IH
•54012 IFLEN(A$)<1THENGOTO54097              MO
•54013 IFA$="$"THENGOSUB52000:GOTO54036      KD
•54014 IFA$="@"THEN54036                     KN
•54015 IFL$="U"ORL$="M"ORL$="B"THEN54000     BP
•54016 IFL$<>"N"THEN54020                    HO
•54017 PRINT"[s D]O YOU [s R][s E][s A][s
  L][s L][s Y] WANT TO [s N][s E][s W] TH
 IS DISK?"                                   MI
•54018 GETP$:IFP$=""THEN54018                KF
•54019 IFP$<>"[s Y]"ANDP$<>"Y"THEN54097      CG
•54020 OPEN15,8,15,A$                        GE
•54021 CLOSE15                               OF
•54036 POKETY,22:POKETX,0:SYS828             FE
•54037 PRINT"[39" "]"                        AL
•54038 POKETY,22:POKETX,0:SYS828             AG
•54040 OPEN15,8,15                           PB
•54041 INPUT#15,A,A$,ET,ES                   EL
•54042 PRINT" [s S]TATUS# ="A"-"A$" "ET",
 "ES                                         OA
•54046 CLOSE15                               PE
•54047 PRINT"[s P]RESS ANY KEY TO CONTINU
 E"                                          CE
•54048 GETA$:IFA$=""THEN54048                NC
•54096 POKETY,22:POKETX,0:SYS828             CA
•54097 PRINT"[39" "]"                        HP
•54098 PRINT"[39" "]"                        EM
•54099 RETURN                                LE
•54500 OT=TR:OS=SC:PRINT"[CLEAR] [s T]RAC
 K ="TR"  [s S]ECTOR="SC:PRINT"[DOWN][DOW
 N][s R]EAD FROM TRACK=>"                    GN
•54501 POKETX,17:POKETY,3:SYS828:GOSUB100    KH
•54502 IFVAL(IN$)=0THEN54501                 KD
•54503 TR=VAL(IN$)                           NM
•54504 PRINT:PRINT" AND SECTOR=>"            KK
•54505 POKETX,13:POKETY,5:SYS828:GOSUB100    IJ
•54506 SC=VAL(IN$)                           ML
•54510 GOTO52720                             ED
```

```
•54596 PRINT"[CLEAR] [s D][s O] [s Y][s O
 ][s U][SS][s R][s E][s A][s L][s L][s Y]
  [s W][s A][s N][s T] [s T][s O][SS][s W
 ][s R][s I][s T][s E] [s T][s O] [s D][s
  I][s S][s K]?"                             GH
•54597 GETA$:IFA$=""THEN54597                AE
•54598 D$=A$:IFA$<>"Y"ANDA$<>"[s Y]"THENR
 ETURN                                       GM
•54600 OT=TR:OS=SC:PRINT"[CLEAR] [s T]RAC
 K ="TR"  [s S]ECTOR="SC:PRINT"[DOWN][DOW
 N][s W]RITE TO TRACK=>"                     LA
•54601 POKETX,16:POKETY,3:SYS828:GOSUB100    HN
•54602 IFVAL(IN$)=0THEN54601                 BD
•54603 TR=VAL(IN$)                           FF
•54604 PRINT:PRINT" AND SECTOR=>"            CL
•54605 POKETX,13:POKETY,5:SYS828:GOSUB100    HG
•54606 SC=VAL(IN$)                           DI
•54610 GOTO52720                             KE
•59000 PRINT"[CLEAR][RVSON][YELLOW][5" "]
 [s T]RACK=[7" "][s S]ECTOR=[15" "][RVSOF
 F][GREEN]"                                  JC
•59001 PRINT"[5"[DOWN]"][16" "][RVSON][YE
 LLOW][24" "][RVSOFF][GREEN]";               CI
•59002 PRINT"[RVSON][YELLOW][40" "][RVSOF
 F][GREEN]";                                 GJ
•59003 PRINT"[DOWN]  [s P]OSITION=>"         OG
•59004 PRINT"[5" "][s A][s S][s C][s I][s
  I]=>"                                      FK
•59005 PRINT"[6" "][s H][s E][s X]$=>"       CP
•59006 PRINT"[3" "][s D]ECIMAL=>"            EC
•59007 PRINT"[DOWN][5" "][RED][RVSON]  [W
 HITE][s R][RED]EAD [s B]LOCK[4" "][WHITE
 ][s W][RED]RITE [s B]LOCK[4" "][RVSOFF][
 GREEN]"                                     ND
•59008 PRINT"[5" "][RED][RVSON]  [WHITE]+
 [RED][s N]EXT [s B]LOCK[3" "][WHITE]-[RE
 D][s P]REVIOUS [s B]LOCK[RVSOFF][GREEN]"    LM
•59009 PRINT"[5" "][RED][RVSON]  [WHITE][
 s N][RED]EXT [s F]-[s L]INK[3" "][WHITE]
 [s J][RED]UMP CRSR-LINK [RVSOFF][GREEN]"    PM
•59010 PRINT"[5" "][RED][RVSON]  [WHITE][
 s C][RED]HANGE [s B][s Y][s T][s E][3" "
 ][WHITE] [RED][s R]E-[s R]EAD BLOCK [RVS
 OFF][GREEN]"                                BF
•59011 PRINT"[5" "][RED][RVSON]  [WHITE]*
 [RED][s N]EW [s S]CREEN[3" "][WHITE]?[RE
 D][s P]RINT [s B]LOCK[3" "][RVSOFF][GREE
 N]"                                         KE
•59012 PRINT"[5" "][RED][RVSON]  [WHITE]$
 [RED][s D]IRECTORY[4" "][WHITE]@[RED][s
 D][s O][s S] [s C]OMMAND[3" "][RVSOFF][G
 REEN]"                                      BM
•59013 PRINT"[5" "][RED][RVSON]  [WHITE][
 s S][RED]TRING [s E]NTRY  [WHITE][s Q][R
 ED]UIT [s P]ROGRAM[3" "][RVSOFF][GREEN]"    BL
•59999 RETURN                                NH
•60000 POKE53281,0:POKE53280,4:PRINTCHR$(
 14)"[GREEN][CLEAR]"                         KJ
```

```
•60001 GOSUB63000                            MD
•60002 FORX=0TO45:READY:POKE49152+X,Y:NEX
 T                                           II
•60003 DATA162,2,32,198,255,162,0,32,207,
 255,134,253,234,234,234,234,157,80,195      PB
•60004 DATA232,208,241,96,162,2,32,201,25
 5,162,0,189,80,195,134,253,234,234,234      CI
•60005 DATA234,32,210,255,232,208,241,96     DO
•60006 FORX=0TO255:SC$(X)=CHR$(X):NEXT       FE
•60007 SC$(0)="[RVSON]@[RVSOFF]":FORX=1TO
 31:SC$(X)=CHR$(X+64):NEXT                   CN
•60008 FORX=129TO159:SC$(X)=CHR$(X-64):NE
 XT                                          GF
•60009 SC$(128)="[RVSON]@[RVSOFF]":SC$(34
 )="'":SC$(32)="[RVSON] [RVSOFF]"            BD
•60010 FORX=828TO835:READY:POKEX,Y:NEXT      GE
•60011 DATA160,00,162,00,32,240,255,96       FF
•60012 TX=829:TY=831                         HC
•60013 HX$="0123456789[s A][s B][s C][s D
 ][s E][s F]"                                JN
•60014 SP$=" ":Z$=CHR$(0):Q$=CHR$(34)        NC
•60015 BASE=50000:CB=55296:LP=0:PS=LP        CI
•60016 SC=00:TR=18                           OK
•61999 GOTO28                                BH
•62000 CLOSE2:CLOSE15:PRINT"[RVSON][YELLO
 W][s D][s I][s S][s K][RVSOFF][CYAN] [s
 O]PERATION ABORTED."                        BP
•62001 PRINT"[s E][s R][s R][s O][s R] #"
 ;X:END                                      JM
•63000 PRINT"[5"[DOWN]"][WHITE][9" "][s P
 ]LEASE WAIT ABOUT FIVE"                     DG
•63001 PRINT"[DOWN][7" "]SECONDS WHILE [s
  I] PERFORM THE  "                          EB
•63002 PRINT"[DOWN][10" "]NECESSARY PRELI
 MINARY"                                     KC
•63003 PRINT"[DOWN][14" "]FUNCTIONS.[GREE
 N][11" "]"                                  EN
•63199 RETURN                                GD
```

128 MULTI RAM
FROM PAGE 30

```
•10 REM *** 128 MULTI RAM *** BUCK CHILDR
 ESS ***                                     KF
•20 REM *** P.O. BOX 13575 SALEM, OR 9730
 9 ***                                       OA
•30 PRINTCHR$(147)"LOADING AND CHECKING D
 ATA LINE:":J=3072                           BP
•40 FORB=0TO11:READA                         MB
•50 IFB=0THENL=PEEK(66)*256+PEEK(65):PRIN
 TCHR$(19)TAB(31)L:PRINT                     LB
•60 IFA<0ORA>255THEN80                       FK
•70 POKEJ+B,A:X=X+A:NEXTB:READA:IFA=XTHEN
 90                                          NP
•80 PRINT"ERROR IN DATA LINE:"L:END          MG
•90 X=0:J=J+12:D=D+1:IFD<31THEN40            HD
•100 PRINT"THE DATA IS OK.":PRINT:SYS3072
 :PRINT"128 MULTI RAM IS ACTIVE.":NEW        MF
•110 DATA169,33,162,12,141,58,3,142,59,3,
 173,93,1048                                 HO
•120 DATA13,208,17,162,10,142,93,13,157,0
 ,19,157,991                                 BI
•130 DATA0,104,157,0,180,202,16,244,96,16
 5,127,208,1499                              GM
•140 DATA51,165,211,201,4,208,45,165,212,
 205,95,13,1575                              IK
•150 DATA240,38,141,95,13,205,96,13,240,3
 0,141,96,1348                               NK
•160 DATA13,201,1,208,11,141,95,13,169,4,
 141,94,1091                                 PE
•170 DATA13,76,58,12,201,3,144,8,201,7,14
 4,7,874                                     NL
•180 DATA201,60,240,89,76,225,197,174,98,
 13,141,98,1612                              GJ
•190 DATA13,173,16,18,157,100,13,173,17,1
 8,157,104,959                               HF
•200 DATA13,174,96,13,189,96,13,133,46,18
 9,100,13,1075                               OA
•210 DATA141,16,18,189,104,13,141,17,18,1
 73,94,13,937                                LO
•220 DATA201,4,240,9,169,0,141,94,13,189,
 108,13,1181                                 DJ
•230 DATA44,169,255,133,54,133,58,141,19,
 18,169,0,1193                               FK
•240 DATA170,133,45,129,45,133,53,133,57,
 141,18,18,1075                              BA
•250 DATA232,134,45,173,96,13,141,97,13,1
 69,160,162,1435                             LF
•260 DATA39,157,0,4,202,16,250,162,3,181,
 243,157,1414                                NL
•270 DATA117,13,169,0,149,243,202,16,244,
 232,142,0,1527                              FB
•280 DATA255,166,235,164,236,142,115,13,1
 40,116,13,32,1627                           NN
•290 DATA125,255,19,18,32,82,65,77,32,61,
 32,0,798                                    GM
•300 DATA173,94,13,240,18,169,128,141,94,
 13,32,125,1240                              KE
•310 DATA255,78,79,82,77,65,76,0,76,19,13
 ,173,993                                    BC
•320 DATA97,13,201,4,176,11,32,125,255,70
 ,82,69,1135                                 GH
•330 DATA69,0,76,19,13,24,105,45,32,210,2
 55,32,880                                   ME
•340 DATA125,255,32,42,42,42,32,66,89,84,
 69,83,961                                   FB
•350 DATA32,70,82,69,69,32,61,32,0,173,18
 ,18,656                                     DA
•360 DATA56,237,16,18,8,170,172,19,18,40,
 176,2,932                                   MG
•370 DATA136,56,152,237,17,18,32,50,142,1
 69,146,32,1187                              HD
•380 DATA210,255,174,115,13,172,116,13,24
 ,32,240,255,1619                            NO
•390 DATA162,3,189,117,13,149,243,202,16,
 248,76,225,1643                              OA
•400 DATA197,0,128,128,255,4,4,19,28,104,
 180,3,1050                                   HJ
•410 DATA3,3,3,19,28,104,180,28,104,180,2
 55,0,907                                     MB
```

ALT-KEY 128
FROM PAGE 14

```
•1 REM ALT-KEY 128                            BJ
•10 SUM=0:FORI=4864TO5392:READJ:POKEI,J:S
 UM=SUM+J:NEXT:IFSUM<>54088THENPRINT"ERRO
 R IN DATA STATEMENTS":END                    JO
•100 SYS4864                                  NI
•4864 DATA 169,55,141,0,10,169,19,141         JA
•4872 DATA 1,10,32,61,19,160,5,185            DB
•4880 DATA 8,21,153,12,3,136,16,247           CC
•4888 DATA 169,0,141,17,21,160,43,162         GD
•4896 DATA 87,169,21,157,32,21,202,152        IK
•4904 DATA 9,128,157,32,21,202,169,0          BJ
•4912 DATA 153,128,21,136,16,235,96,32        NP
•4920 DATA 61,19,76,3,64,120,169,121          IK
•4928 DATA 141,60,3,169,19,141,61,3           HL
•4936 DATA 169,84,141,20,3,169,19,141         MA
•4944 DATA 21,3,88,96,173,17,21,240           EP
•4952 DATA 29,172,18,21,177,250,240,19        HG
•4960 DATA 166,208,236,32,10,176,15,157       OJ
•4968 DATA 74,3,232,134,208,200,140,18        FA
•4976 DATA 21,208,3,141,17,21,76,101          JI
•4984 DATA 250,72,138,41,8,208,3,76           CB
•4992 DATA 163,19,104,56,233,48,144,20        CA
•5000 DATA 201,43,176,16,141,19,21,32         FO
•5008 DATA 228,20,169,1,141,17,21,169         AN
•5016 DATA 0,141,18,21,169,0,170,160          MP
•5024 DATA 88,208,2,170,104,76,173,198        IA
•5032 DATA 72,152,72,160,2,177,61,217         AC
•5040 DATA 14,21,208,5,136,16,246,48          ME
•5048 DATA 7,104,168,104,56,76,33,67          JN
•5056 DATA 104,104,162,0,160,2,169,39         CD
•5064 DATA 24,76,33,67,201,39,240,4           IB
•5072 DATA 56,76,205,81,169,65,32,12          CJ
•5080 DATA 86,169,76,32,12,86,169,84          AH
•5088 DATA 76,46,81,76,108,121,201,39         NO
•5096 DATA 240,4,56,76,169,75,32,128          IE
•5104 DATA 3,240,240,56,233,48,144,235        PM
•5112 DATA 201,43,176,231,141,19,21,32        OD
•5120 DATA 128,3,201,44,208,221,160,0         MN
•5128 DATA 140,20,21,32,128,3,240,63          FP
•5136 DATA 201,199,240,37,201,34,208,203      MA
•5144 DATA 230,61,208,2,230,62,141,1          LJ
•5152 DATA 255,160,0,177,61,141,3,255         DO
•5160 DATA 240,37,201,34,240,221,172,20       PO
•5168 DATA 21,153,0,11,238,20,21,208          KN
•5176 DATA 223,32,128,3,32,244,135,172        CM
•5184 DATA 20,21,138,153,0,11,238,20          EE
•5192 DATA 21,32,134,3,76,14,20,172           CK
•5200 DATA 20,21,169,0,153,0,11,32            OJ
•5208 DATA 228,20,160,255,200,177,250,208     AD
•5216 DATA 251,152,56,237,20,21,240,107       FF
•5224 DATA 144,42,133,13,169,0,133,109        PL
•5232 DATA 32,244,20,32,192,93,173,19         EP
•5240 DATA 21,10,170,224,88,240,18,232        KE
•5248 DATA 232,56,189,32,21,229,13,157        LI
•5256 DATA 32,21,176,3,222,33,21,208          EF
•5264 DATA 234,76,211,20,73,255,24,105        JO
•5272 DATA 1,133,109,169,0,133,13,24          MC
•5280 DATA 173,118,21,101,109,173,119,21      MM
•5288 DATA 105,0,205,7,21,144,3,76            PO
•5296 DATA 58,77,32,244,20,32,215,93          LE
•5304 DATA 173,19,21,10,170,224,88,240        MN
•5312 DATA 18,232,232,24,189,32,21,101        LL
•5320 DATA 109,157,32,21,144,3,254,33         PC
•5328 DATA 21,208,234,172,20,21,185,0         FL
•5336 DATA 11,145,250,136,192,255,208,246     HN
•5344 DATA 32,134,3,96,173,19,21,10           FP
•5352 DATA 168,185,32,21,133,250,185,33       JC
•5360 DATA 21,133,251,96,165,250,133,36       HN
•5368 DATA 165,251,133,37,173,118,21,133      AB
•5376 DATA 38,173,119,21,133,39,96,28         CJ
•5384 DATA 168,19,204,19,230,19,65,76         GJ
•5392 DATA 84                                 BD
```

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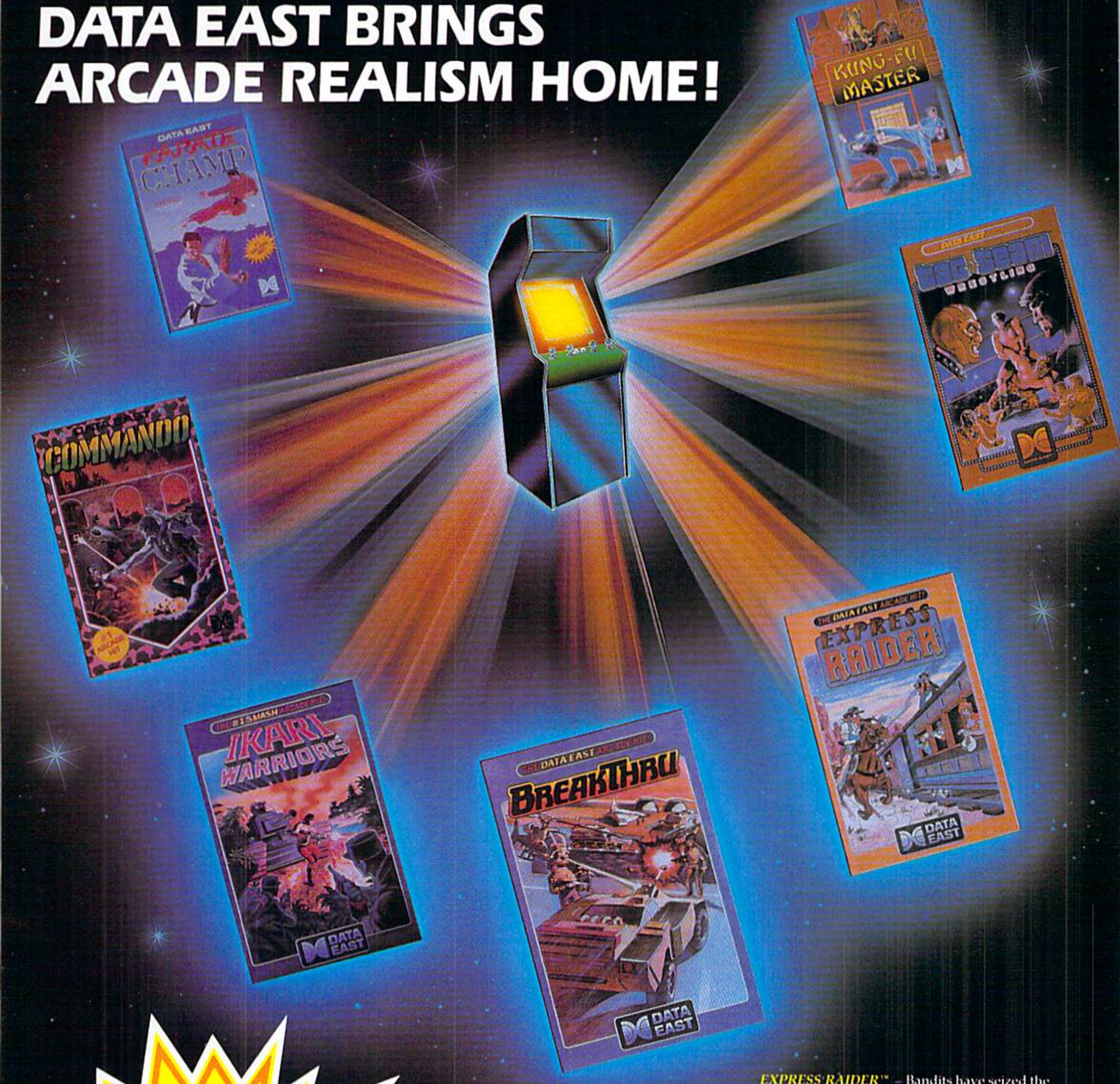

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